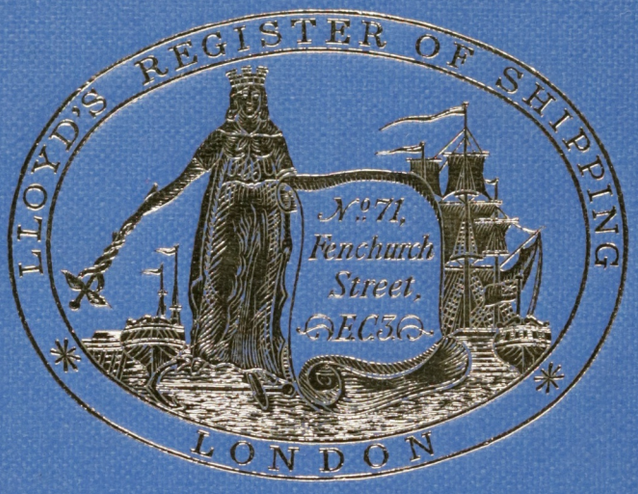

GEOMETRIC PROPERTIES OF ROLLED SECTIONS AND BUILT GIRDERS

VOL. 1.

C.E. BOAGEY

REGISTER BOOKS AND OTHER PUBLICATIONS ISSUED BY THE COMMITTEE OF LLOYD'S REGISTER OF SHIPPING

LLOYD'S REGISTER BOOK (The Register of Ships and List of Shipowners are issued annually in July and August respectively; the Appendix in January).

The Register of Ships (in two volumes A–L and M–Z) contains the names, classes and general information concerning the ships classed by Lloyd's Register of Shipping (including the British Corporation Register); also particulars of all known ocean-going merchant ships in the world, of 100 tons gross and upwards.

The second volume (M–Z) also contains floating docks, liquefied gas carriers, ships carrying refrigerated cargo, refrigerated cargo containers, refrigerated stores classed with Lloyd's Register and off-shore drilling rigs, as well as lists of changes of ships' names and compound names.

The Register is kept up to date by means of cumulative monthly Supplements containing the latest survey records for all classed ships, and changes of name, ownership, flag, tonnage, &c., for all ships, whether classed or not. Each Supplement is accompanied by particulars of new entries to the Register—that is, new ships and ships of which the names have been changed.

A Weekly List of Alterations in the Register of Ships is also published.

List of Shipowners contains a list of owners and managers of the ships recorded in the Register with their fleets.

The Appendix contains lists of shipbuilders with existing ships they have built; marine enginebuilders and boilermakers; dry and wet docks; telegraphic addresses and codes used by shipping firms; marine insurance companies.

Statistical Tables are issued gratis to Subscribers to the Register Book.

REGISTER OF YACHTS Published annually in April, this volume contains in addition to detailed information relating to yachts classed by the Society, the names, dimensions, etc., of other British and overseas yachts, whose particulars are known; a list of one-design and restricted classes; national authorities and list of sail numbers of certain classes of racing yachts*; geographical list of yacht clubs; list and particulars of yacht and sailing clubs with the names of officers; index of signal letters; late names of yachts; names and addresses of yacht builders and designers with the yachts they have built and designed; list of owners with their addresses, clubs and the names of their yachts.

***LIST OF NATIONAL AUTHORITIES AND SAIL NUMBERS OF RACING YACHTS** (as published in the Register of Yachts) may be purchased separately.

THE FLAG BOOKLET (new edition published in 1966). A comprehensive record, in full colour, of yacht club burgees and defaced ensigns as well as the distinguishing flags of yachtsmen.

YACHT RULES

Vol. I:—WOOD AND COMPOSITE YACHTS (Sailing, Auxiliary, and Full Power)
Vol. II:—STEEL YACHTS
Vol. III:—INTERNATIONAL RATING CLASSES
PROVISIONAL RULES FOR THE CONSTRUCTION OF REINFORCED PLASTIC YACHTS
A GUIDE TO MACHINERY AND ELECTRICAL EQUIPMENT IN YACHTS

REGISTER OF AMERICAN YACHTS

This Register is published annually in May from the Society's New York Office. Copies may also be obtained on application to the Manager, Lloyd's Register Printing House, Manor Royal, Crawley, Sussex, England.

This book contains the names, dimensions, and full particulars of the yachts of the United States and Canada, so far as they are ascertainable; reproductions in colour of the burgees of yacht clubs and the private signals of yachtsmen; a list of yacht clubs with the names of their officers; an index of signal letters; late names of yachts; and a list of yacht owners of the United States and Canada, with their addresses, clubs and yachts.

Also issued separately:—

Club Burgees and Private Signals (in colour).

RULES AND REGULATIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS, which contain the following:—

Chapter	
	REGULATIONS
A	General Rules and Regulations of Lloyd's Register of Shipping.
B	Classification Regulations.
C	Periodical Survey Regulations.
	CONSTRUCTION RULES
D	Steel Ships.
E	Pumping and Piping.
F	Fire Protection, Detection and Extinction.
G	Conditions for Survey of Machinery during Construction.
H	Main and Auxiliary Engines and Gearing.
J	Boilers and other Pressure Vessels.
K	Spare Gear for Steam and Oil Engine Machinery Installations.
L	Control Engineering Equipment.
M	Electrical Equipment and Electric Propelling Machinery.
N	Refrigerated Cargo Installations.
P	Materials for Ship Construction.
Q	Materials for Boiler, Pressure Vessel and Machinery Construction.
	Appendices giving lists of Approved Manufacturers of Materials and Proving Establishments
R	Provisional Rules and Guidance Notes:
	(A) Methane Gas as fuel for the propulsion of Methane Tankers.
	(B) Plastic Pipes.
	(C) Classification of Nuclear Ships.
	(D) Metal Pipes for Water Services.
	(E) Torsional Vibration Characteristics of Main and Auxiliary Oil Engines.
	(F) Classification of Floating Docks.
	(G) Propeller—Hull Clearances.
	(H) Repairs by Welding to Steel Castings for Crankshafts.

EXTRACTS FROM THE RULES:—

	CHAPTER(S)
No. 1	B and C
No. 2	B, C, D and P (including Appendices)
No. 3	B, C, E, F, G, H, J, K, Q (including Appendices) and R (A, B, D, E, G and H)
No. 4	E, G, H, K, Q (including Appendices) and R (A, B, D, E, G and H)
No. 5	J, Q (including Appendices) and R (A and H)
No. 6	F
No. 7	M
No. 8	N (and Frozen Meat Stores)
No. 9	P, Q (including Appendices) and R (H)

RULES FOR STEEL TRAWLERS

GEOMETRIC PROPERTIES OF ROLLED SECTIONS AND BUILT GIRDERS

Volume I British and U.S.A. Sections Volume II Metric Sections Volume III Japanese Sections

A series of curves giving section modulus and moment of inertia of a wide range of sections used in shipbuilding, in association with varying thicknesses of plating. The areas of sections (without plating) are also given.

ANCHORS—APPROVED DESIGNS

Comprising lists (1) in alphabetical order of Firms, (2) in alphabetical order of name (if any) of anchors, together with descriptive sketches. Revised and brought up to date, 1945.

FREIGHT CONTAINER CERTIFICATION SCHEME
PROVISIONAL REQUIREMENTS FOR THE SURVEY OF PRESSURE COMPONENTS FOR LAND-BASED NUCLEAR INSTALLATIONS
APPROVED ELECTRODES FOR WELDING IN HULL CONSTRUCTION
LIST OF APPROVED FUSES
LIST OF TYPE TESTED CIRCUIT-BREAKERS
CARGO HANDLING GEAR CODE
PROVISIONAL RULES FOR THE APPLICATION OF GLASS REINFORCED PLASTICS TO FISHING CRAFT
AUTOMATIC CONTROLS IN SHIPS
GUIDANCE NOTES AND REQUIREMENTS FOR THE CLASSIFICATION OF AIR CUSHION VEHICLES

TERMS OF SUBSCRIPTION FOR THE REGISTER BOOKS AND PRICES OF OTHER PUBLICATIONS UPON APPLICATION TO THE MANAGER, LLOYD'S REGISTER PRINTING HOUSE, MANOR ROYAL, CRAWLEY, SUSSEX, ENGLAND

LLOYD'S REGISTER OF SHIPPING

FOUNDED 1760

GEOMETRIC PROPERTIES
OF
ROLLED SECTIONS AND BUILT GIRDERS

Volume I

BRITISH AND U.S.A. SECTIONS

71, FENCHURCH STREET, LONDON, E.C.3

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71, Fenchurch Street London E.C.3, England

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PREFACE

This book has been prepared for the use of shipbuilders and designers in selecting the appropriate sections for longitudinals, frames and other stiffening members as required by the Society's revised Rules for Oil Tankers. The section modulus given by the formulæ in these Rules is that of the stiffener in association with 24 inches of plating having the same thickness as the associated shell, deck or bulkhead plating, and curves have therefore been prepared giving the section modulus of sections in association with varying thicknesses of plating.

An endeavour has been made to include all rolled sections used in shipbuilding and it is intended to issue supplementary sheets when new sections are introduced. Suggestions from users of the book for the inclusion of additional sections will be welcome.

The areas of the sections (without plating) have been included so as to facilitate the selection of the most economic section.

Curves giving the moment of inertia in association with plating of varying thickness have also been included.

A set of curves is provided for determining the section modulus of built girders; these curves are also applicable to built or flat bar longitudinals.

June, 1960

Chapter D

OIL TANKERS

Section 53

EFFECTIVE SECTION MODULUS, FACE AREAS AND MINIMUM THICKNESSES

EFFECTIVE SECTION MODULUS

Longitudinals, Frames and Stiffeners

5301 For longitudinals, side frames and bulkhead stiffeners the section modulus required by the appropriate formula is to be that of the section in association with 24 inches of plating having the same thickness as the shell, deck or bulkhead plating as appropriate. Where the attached plating is of varying thickness, the mean thickness over the appropriate span is to be used.

The effective section moduli of rolled sections and the area of the section without plating are given in the publication "Geometric Properties of Rolled Sections and Built Girders".

The effective section moduli of flat bars or built sections may be obtained from curves in the above publication.

Transverses, Webs, Stringers and Girders

5302 For transverses, webs, stringers and girders, the section modulus required by the appropriate formula is to be that of the member in association with an effective area of shell, deck or bulkhead plating.

5303 Except for corrugated bulkheads, the effective area is to be:—

$A = 12\ k\ b\ t_p$ square inches,

where k = a coefficient obtained from the table below,

b = actual width in feet of load-bearing plating, i.e., one half the sum of spacings of parallel adjacent members of greater or equivalent length (*see* sketches on pages ii and iii),

t_p = mean thickness of attached shell, deck or bulkhead plating in inches,

l = overall length of girder, transverse, etc., in feet (*see* sketches on pages ii and iii).

$\frac{l}{b}$	0·5	1·0	2·0	3·0	4·0	5·0	6·0
k	0·12	0·23	0·45	0·67	0·80	0·90	1·00

For intermediate values of $\frac{l}{b}$, k is to be obtained by interpolation. Where $\frac{l}{b}$ exceeds 6·0, k is to be taken as 1·0.

5304 For corrugated bulkheads the effective area is to be:—

(a) for girders, etc., at right angles to the direction of corrugations:

A = area of face plate in square inches (*see also* 5307).

(b) for girders, etc., parallel to the direction of corrugations:

$A = b_c\ t_p$ square inches,

where b_c = breadth in inches of flat panel of corrugated bulkhead,

t_p = thickness of bulkhead plating in inches. Where the bulkhead thickness varies, the mean thickness over the appropriate span is to be used.

5305 The effective section modulus of any transverse, web, stringer or girder is given by the formula:—

$$\frac{I}{y} = ad + \frac{t_w\ d^2}{6}\left(1 + \frac{A - a}{A + \frac{1}{2}t_w d}\right) \text{ inches}^3$$

where a = area of face plate in square inches,

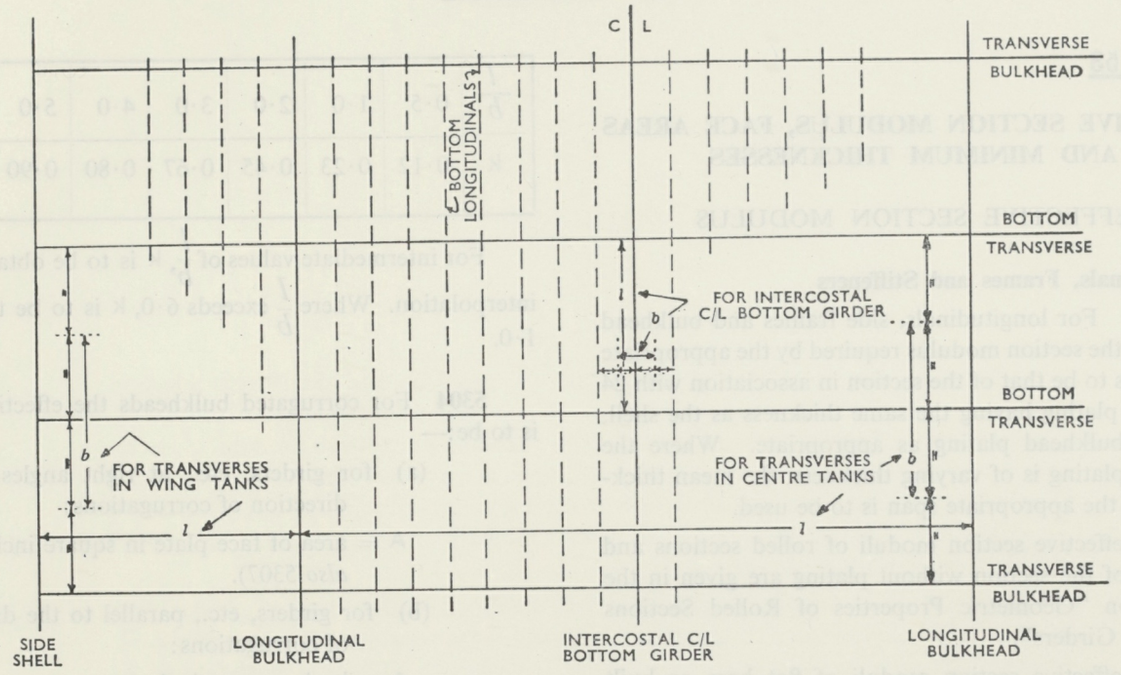
d = depth of girder, etc., between inside of face plate and attached plating, in inches. Where the girder, etc., is at right angles to the line of corrugations the maximum depth is to be taken,

t_w = thickness of web in inches,

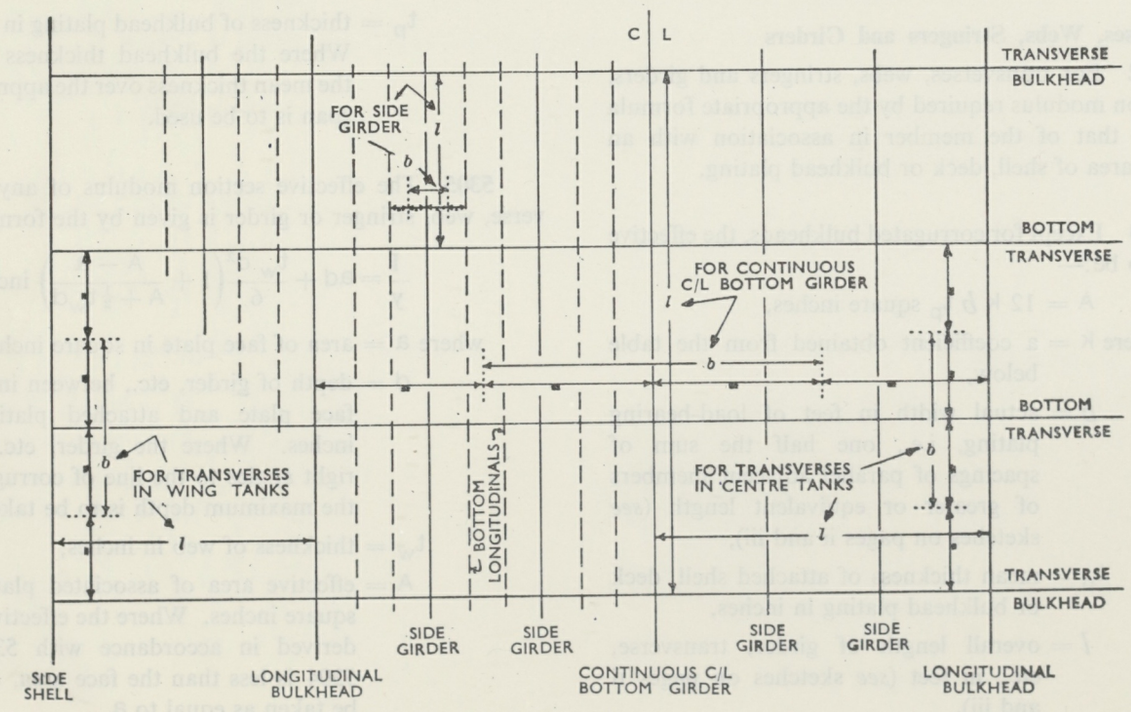
A = effective area of associated plating in square inches. Where the effective area derived in accordance with 5303 or 5304 is less than the face area, A is to be taken as equal to a.

TO ILLUSTRATE PARAGRAPH D 5303

(a) BOTTOM STRUCTURE WITH INTERCOSTAL BOTTOM CENTRE-LINE GIRDER

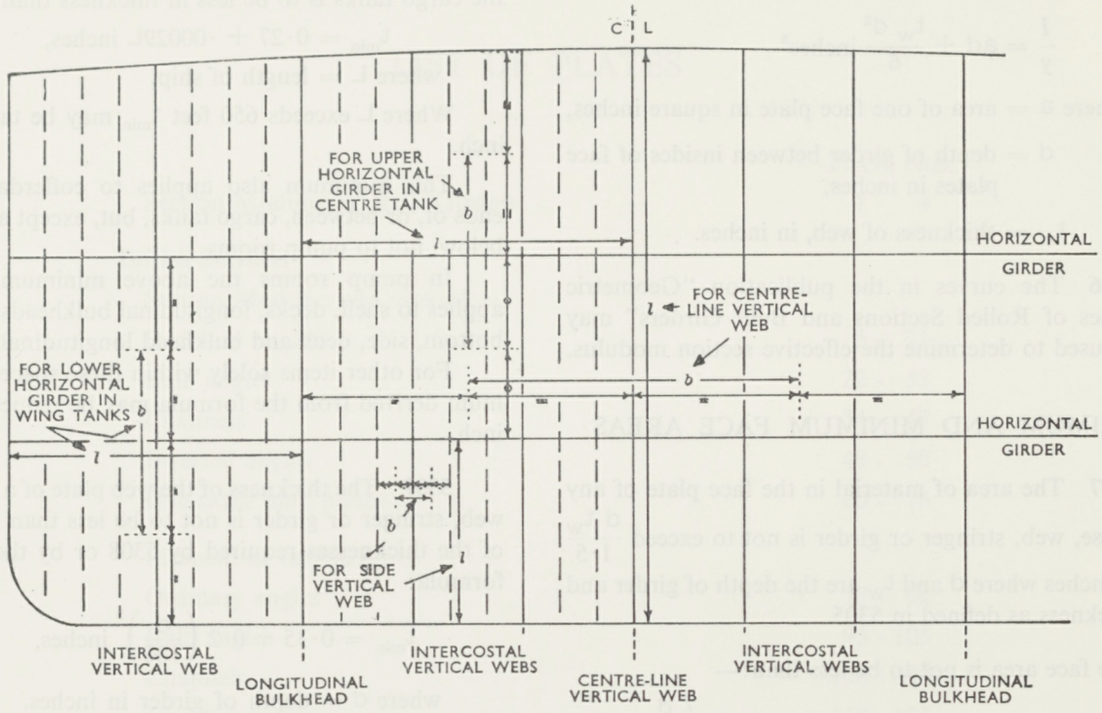


(b) BOTTOM STRUCTURE WITH CONTINUOUS BOTTOM CENTRE-LINE GIRDER

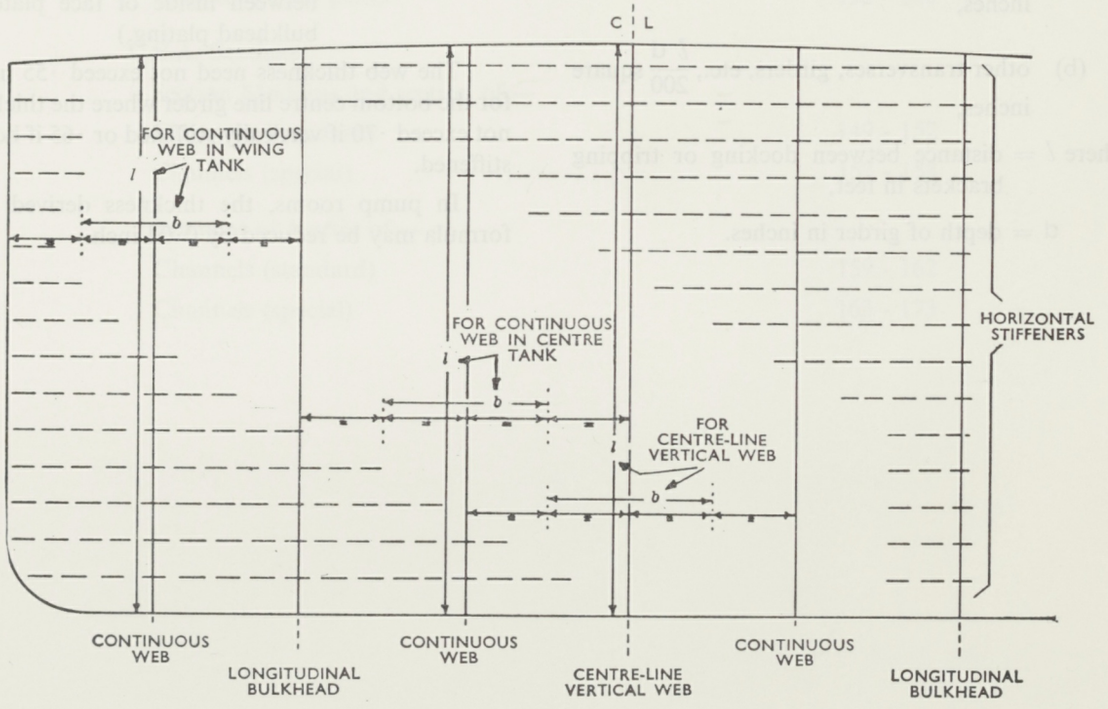


TO ILLUSTRATE PARAGRAPH D 5303

(c) TRANSVERSE BULKHEAD WITH VERTICAL STIFFENING



(d) TRANSVERSE BULKHEAD WITH HORIZONTAL STIFFENING



For girders, etc., which are symmetrical on each side of the bulkhead the attached plating is to be ignored and the effective section modulus is given by:—

$$\frac{I}{y} = ad + \frac{t_w d^2}{6} \text{ inches}^3$$

where a = area of one face plate in square inches,

d = depth of girder between insides of face plates in inches,

t_w = thickness of web, in inches.

5306 The curves in the publication "Geometric Properties of Rolled Sections and Built Girders" may also be used to determine the effective section modulus.

MAXIMUM AND MINIMUM FACE AREAS

5307 The area of material in the face plate of any transverse, web, stringer or girder is not to exceed $\frac{d\ t_w}{1{\cdot}5}$ square inches where d and t_w are the depth of girder and web thickness as defined in 5305.

The face area is not to be less than:—

(a) bottom centre line girder $\frac{l\ d}{50}$ square inches,

(b) other transverses, girders, etc., $\frac{l\ d}{200}$ square inches,

where l = distance between docking or tripping brackets in feet,

d = depth of girder in inches.

MINIMUM THICKNESS

5308 No part of the structure within the range of the cargo tanks is to be less in thickness than:

$$t_{min} = 0{\cdot}27 + {\cdot}00029L \text{ inches},$$

where L = length of ship.

Where L exceeds 650 feet t_{min} may be taken as ·46 inch.

This minimum also applies to cofferdams at the ends of, or between, cargo tanks, but, except as indicated below, not to pump rooms.

In pump rooms the above minimum thickness applies to shell, decks, longitudinal bulkheads and to the bottom, side, deck and bulkhead longitudinals.

For other items solely within these spaces the minimum derived from the formula may be reduced by 0·04 inch.

5309 The thickness of the web plate of a transverse, web, stringer or girder is not to be less than the greater of the thicknesses required by 5308 or by the following formula:

$$t_{min} = 0{\cdot}35 + 0{\cdot}2\left(\frac{d}{100}\right)^2 \text{ inches},$$

where d = depth of girder in inches. (In a symmetrical girder d may be measured between inside of face plate and the bulkhead plating.)

The web thickness need not exceed ·55 inch except for the bottom centre line girder where the thickness need not exceed ·70 if vertically stiffened or ·65 if horizontally stiffened.

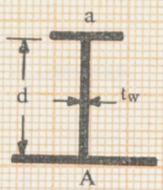
In pump rooms, the thickness derived from this formula may be reduced by 0·04 inch.

LIST OF PLATES

	Plate Nos.
Section Modulus of Built Girders	1 - 4
British Sections	
Section Modulus and area of:—	
Ordinary angles	5 - 21
Bulb angles	22 - 33
Channels	34 - 47
Inverted angles	48 - 59
One-sided bulb plates	60 - 76
Moment of Inertia of:—	
Ordinary angles	77 - 92
Bulb angles	93 - 105
Channels	106 - 117
Inverted angles	118 - 132
One-sided bulb plates	133 - 148
U.S.A. Sections	
Section Modulus and section of:—	
Channels (standard)	149 - 152
Channels (special)	153 - 158
Moment of Inertia of:—	
Channels (standard)	159 - 162
Channels (special)	163 - 173

SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)



$$\frac{I}{y} = C \times A \times d$$

$$\text{or } C = \frac{\text{Required } \frac{I}{y}}{A \times d}$$

C

1·2 1·1 1·0 0·9 0·8 0·7 0·6 0·5 0·4 0·3 0·2 0·1 0·0

$\frac{a}{A}$

0·80 0·70 0·60 0·50 0·45 0·40 0·35 0·30 0·25 0·20 0·15 0·10 0·05 0·00

$\frac{t_w d}{A}$

0·0 0·1 0·2 0·3 0·4 0·5 0·6 0·7 0·8 0·9 1·0 1·1 1·2 1·3 1·4 1·5 1·6 1·7 1·8 1·9 2·0

Limit where $a = \frac{P \times d}{1.5}$

Curves are extended in plates 2, 3 & 4.

For definition of A see D 5303, 5304 & 5305
For A for flat bar longitudinals see D 5301

For flat bar longitudinals take $\frac{a}{A} = 0{\cdot}00$

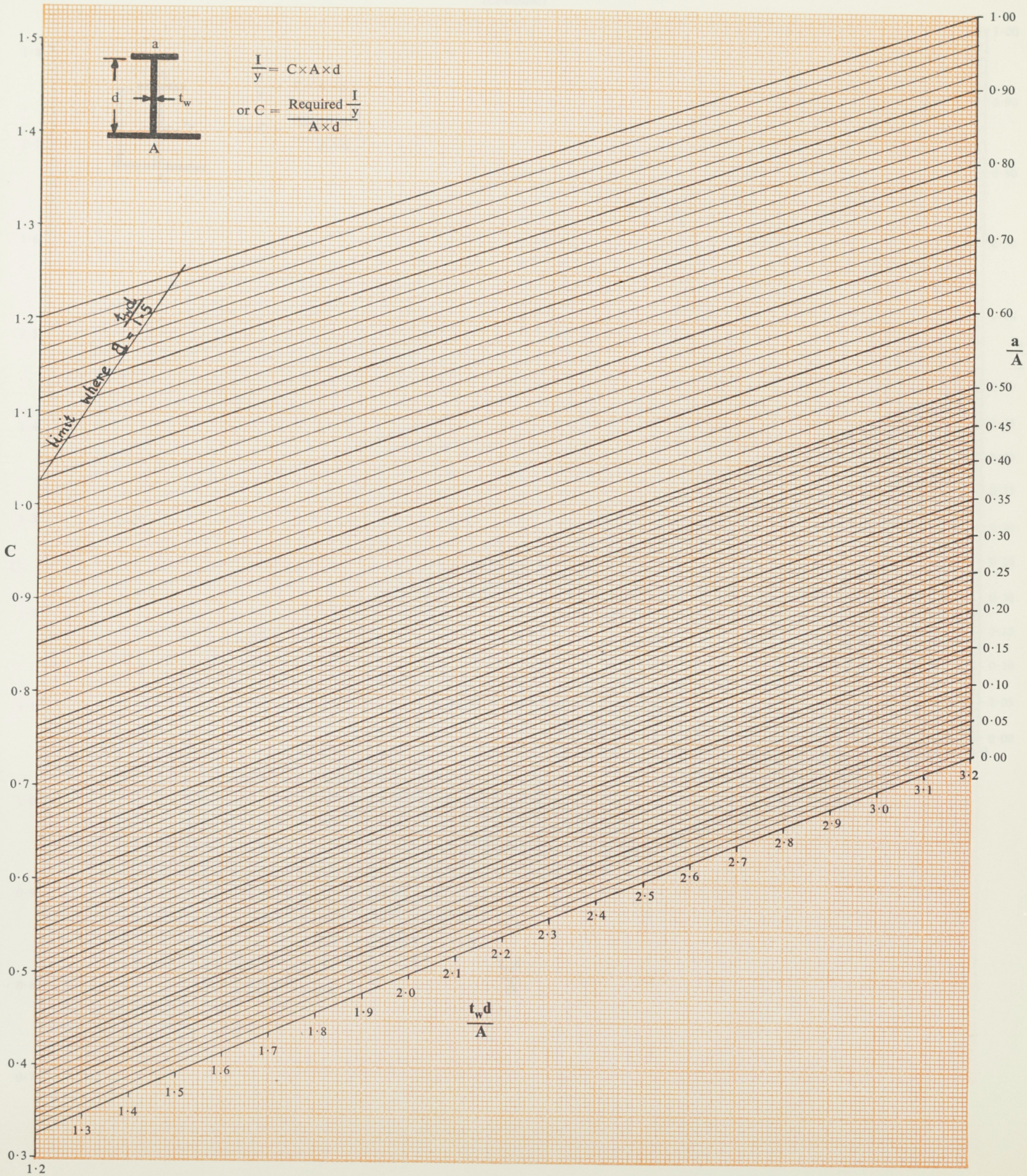
For symmetrical girders take $\frac{a}{A} = 1{\cdot}00$

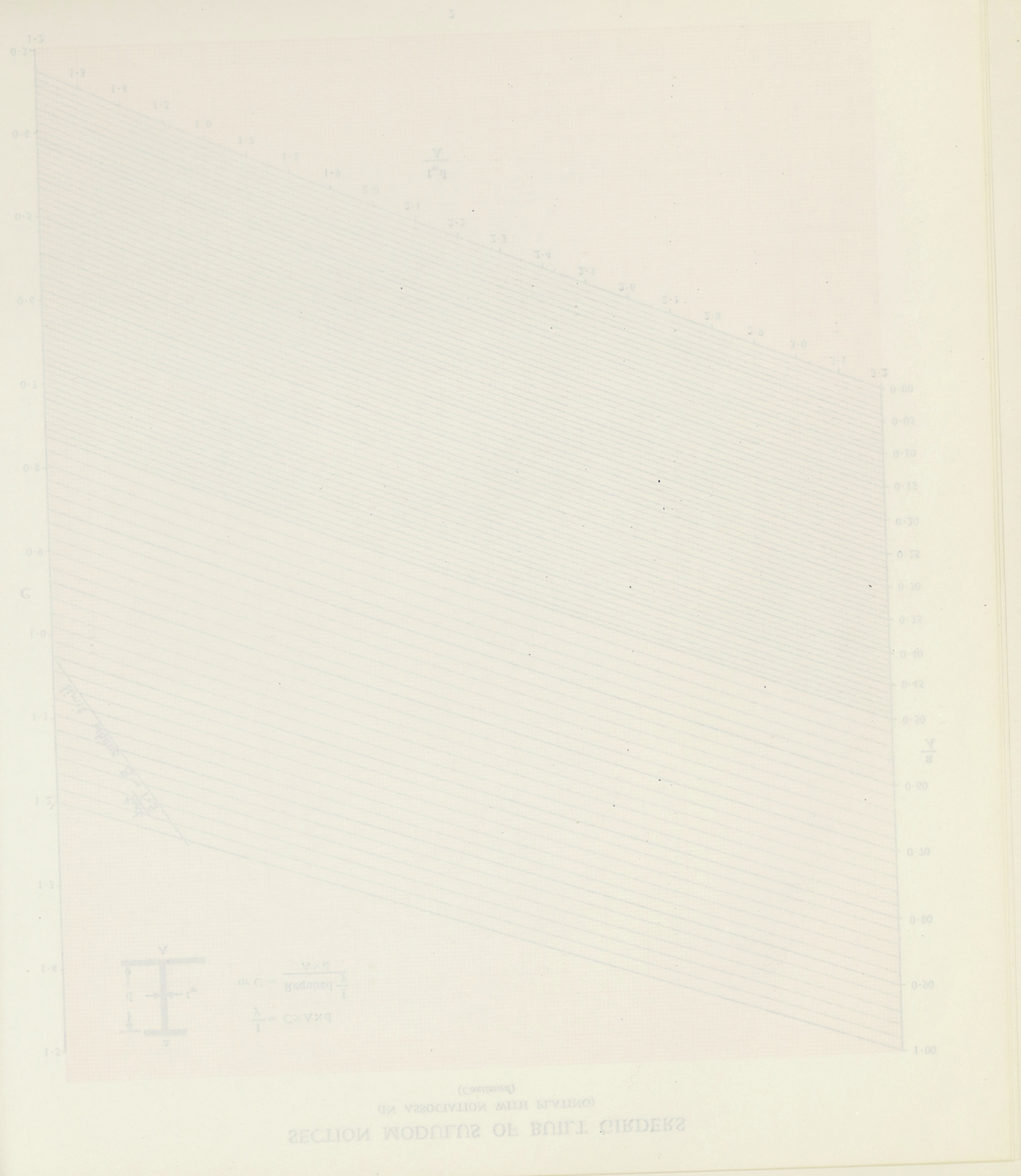
Units:
A and a are in square inches
t_w and d are in inches

SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)

(*Continued*)





SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)

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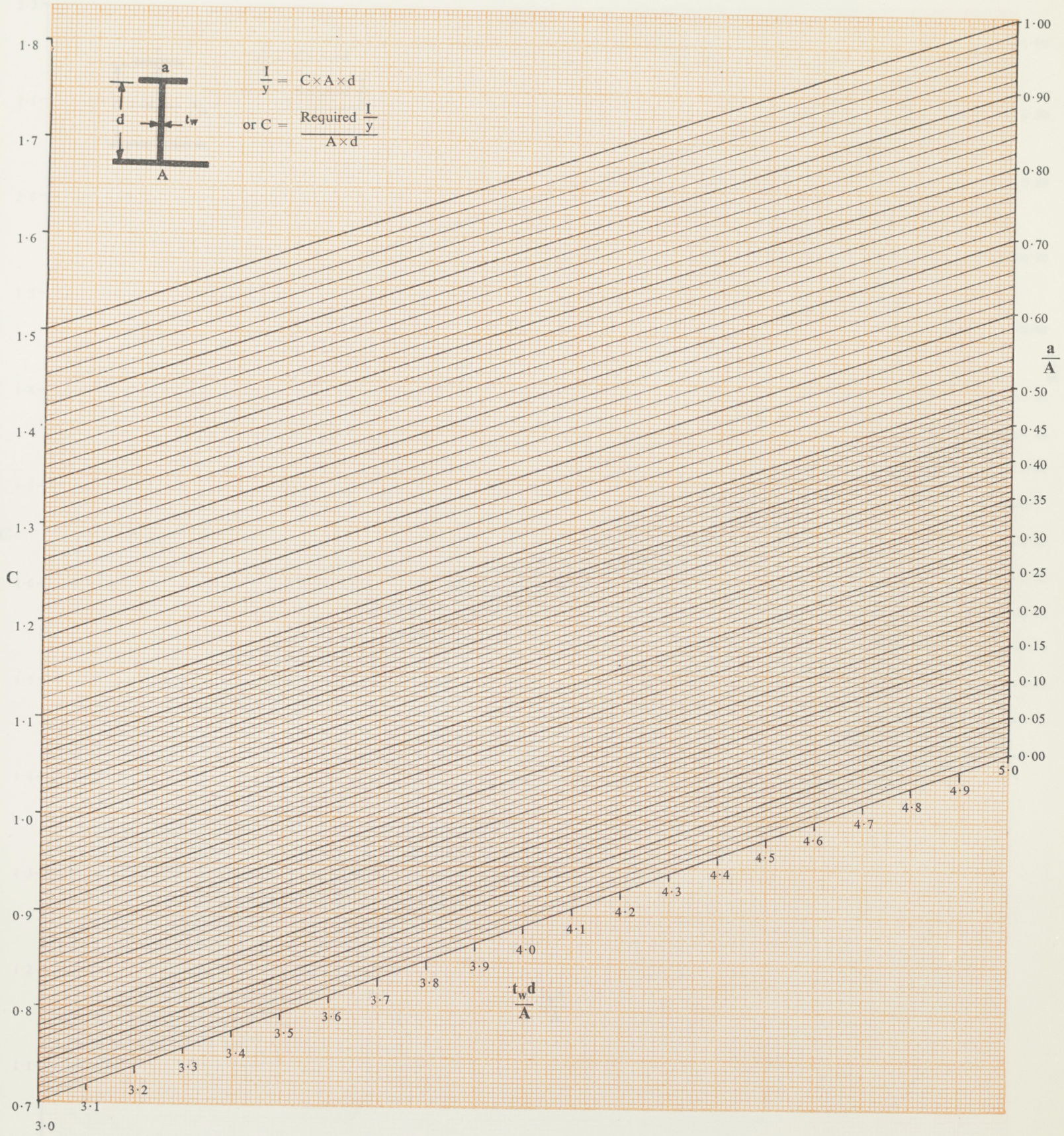
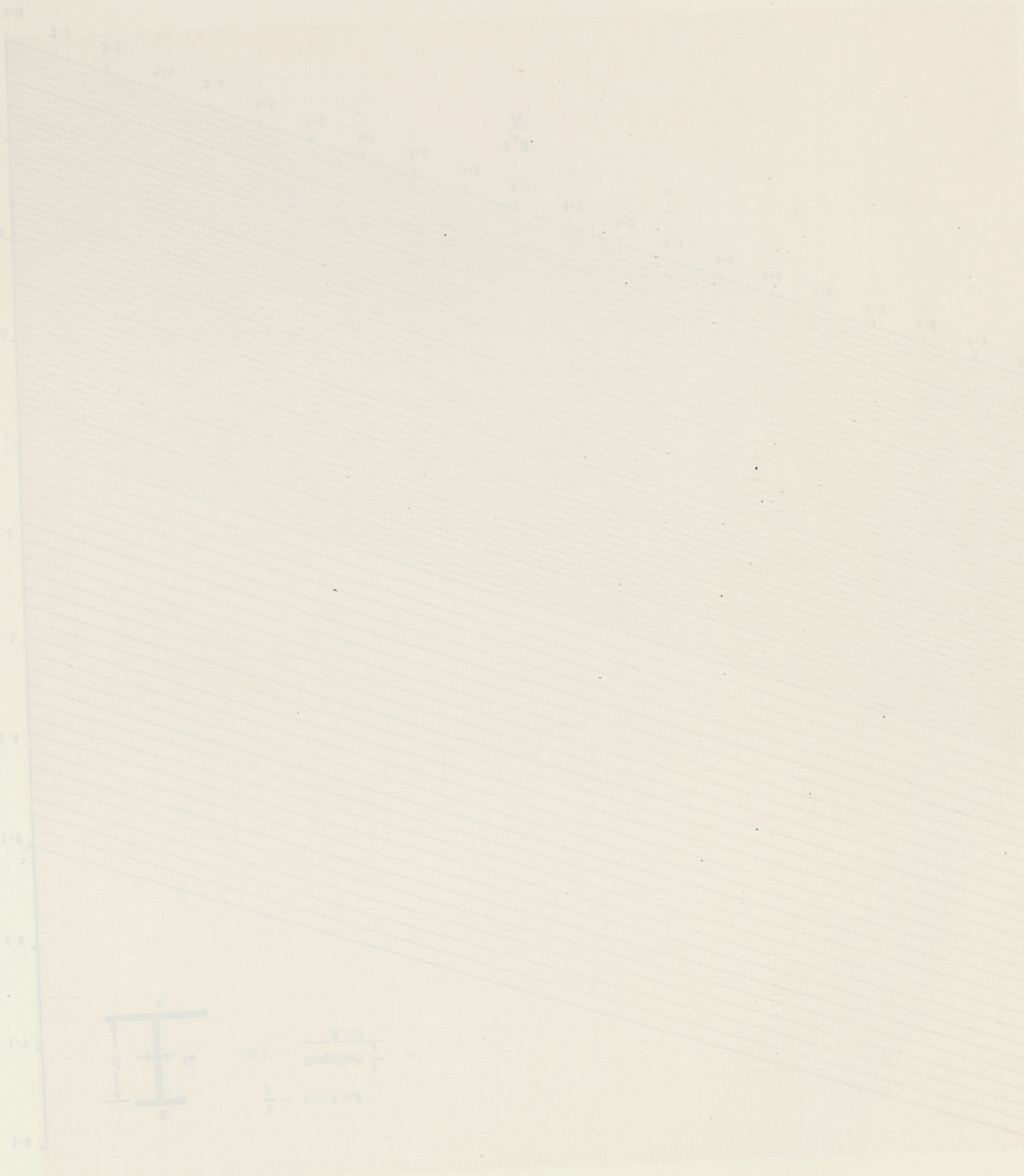
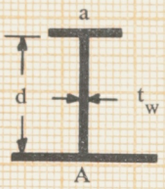




SECTION MODULUS OF BUILT GIRDERS

(IN ASSOCIATION WITH PLATING)

(*Continued*)



$$\frac{I}{y} = C \times A \times d$$

$$\text{or } C = \frac{\text{Required } \frac{I}{y}}{A \times d}$$

C

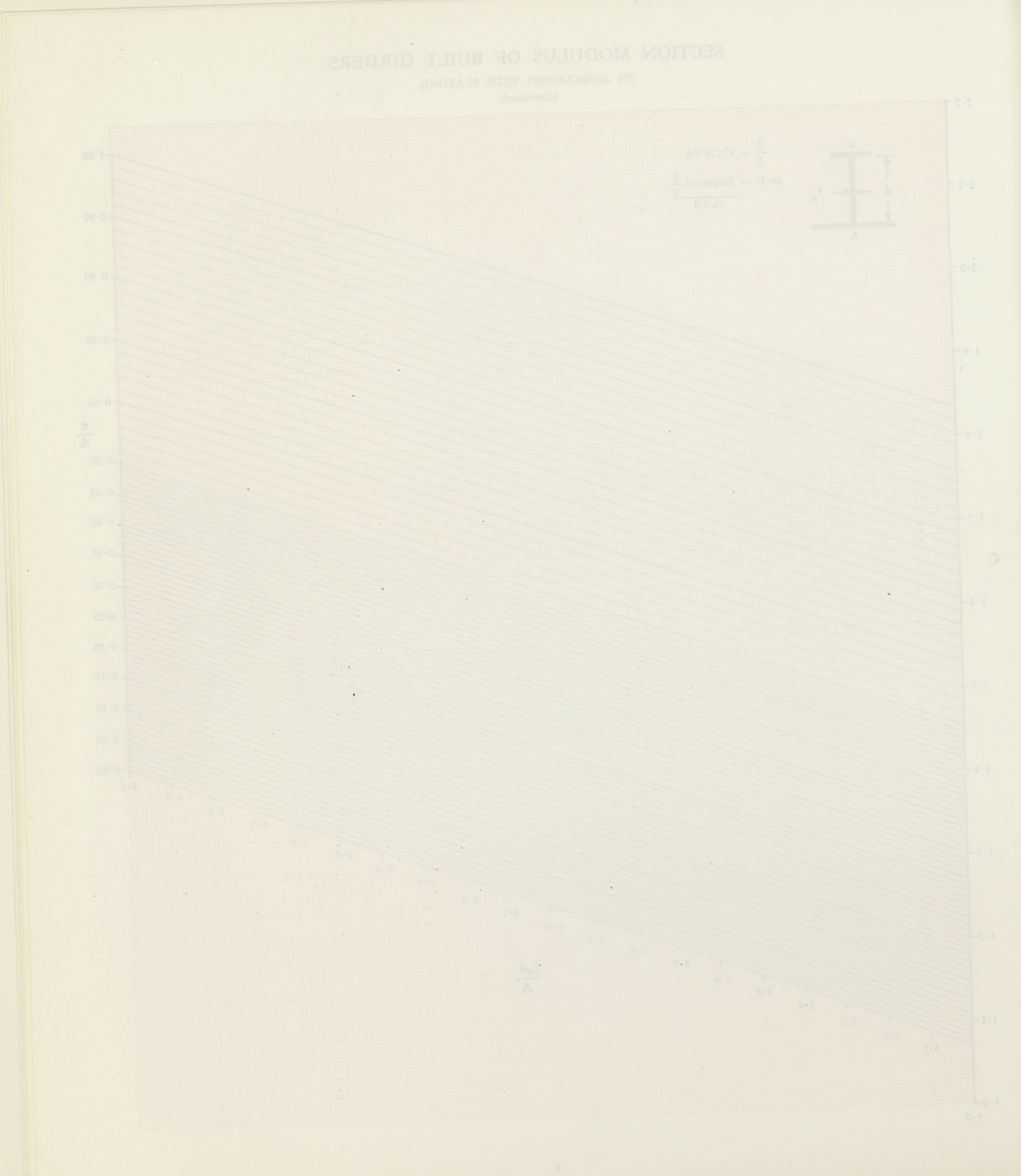
2·2
2·1
2·0
1·9
1·8
1·7
1·6
1·5
1·4
1·3
1·2
1·1
1·0

5·0 5·1 5·2 5·3 5·4 5·5 5·6 5·7 5·8 5·9 6·0 6·1 6·2 6·3 6·4 6·5 6·6 6·7 6·8 6·9 7·0

$\frac{t_w d}{A}$

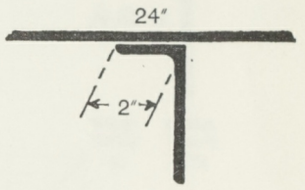
$\frac{a}{A}$

1·00
0·90
0·80
0·70
0·60
0·50
0·45
0·40
0·35
0·30
0·25
0·20
0·15
0·10
0·05
0·00



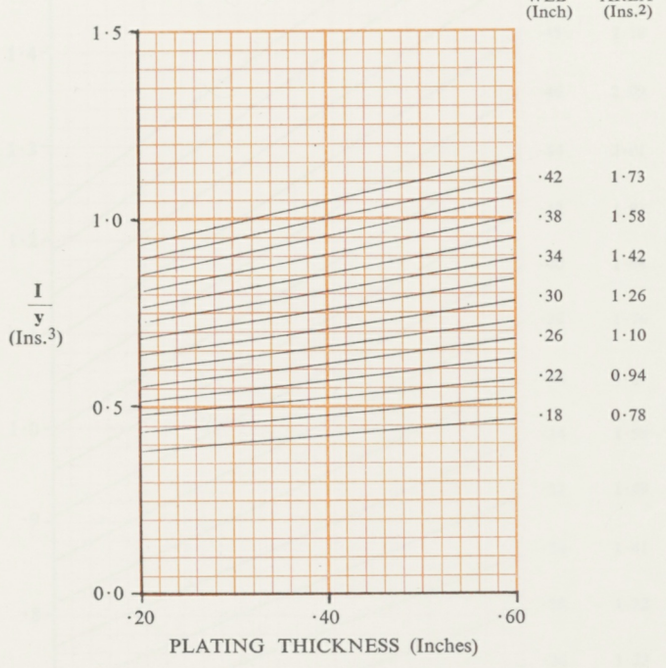
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



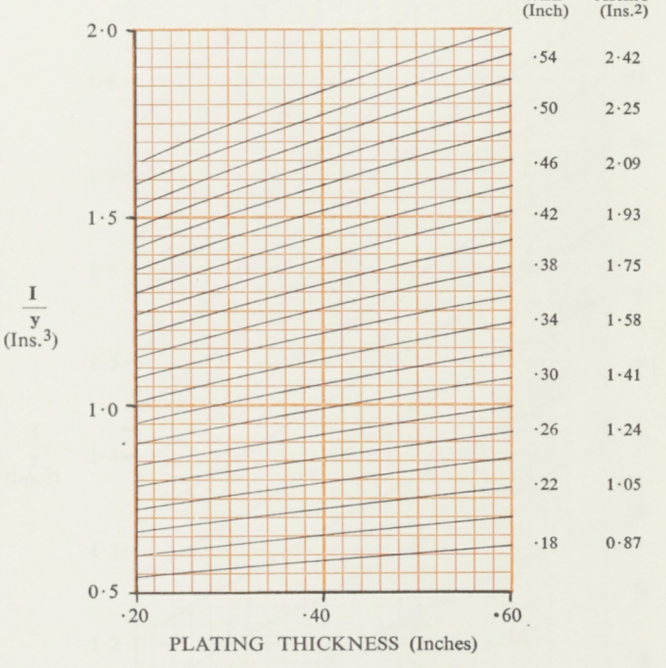
2″ FLANGE

2½″ DEPTH



WEB (Inch)	AREA (Ins.2)
·42	1·73
·38	1·58
·34	1·42
·30	1·26
·26	1·10
·22	0·94
·18	0·78

3″ DEPTH



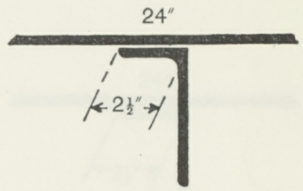
WEB (Inch)	AREA (Ins.2)
·54	2·42
·50	2·25
·46	2·09
·42	1·93
·38	1·75
·34	1·58
·30	1·41
·26	1·24
·22	1·05
·18	0·87

24"
2"

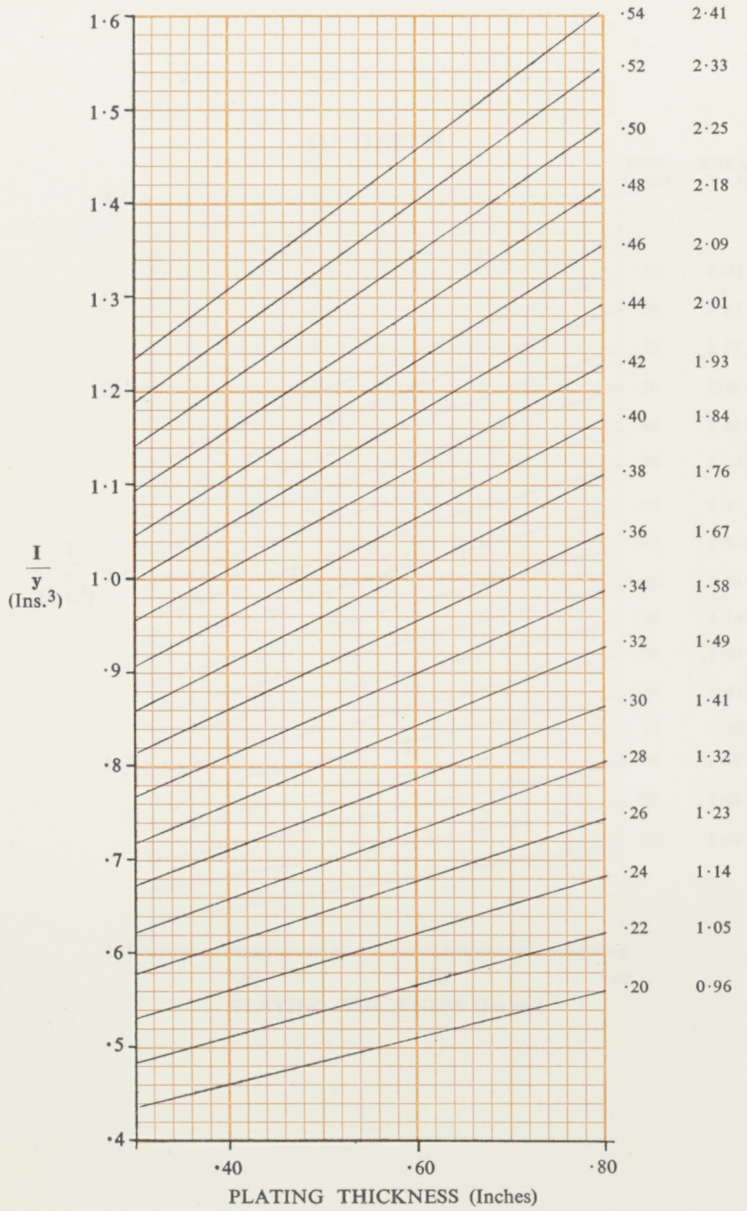
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

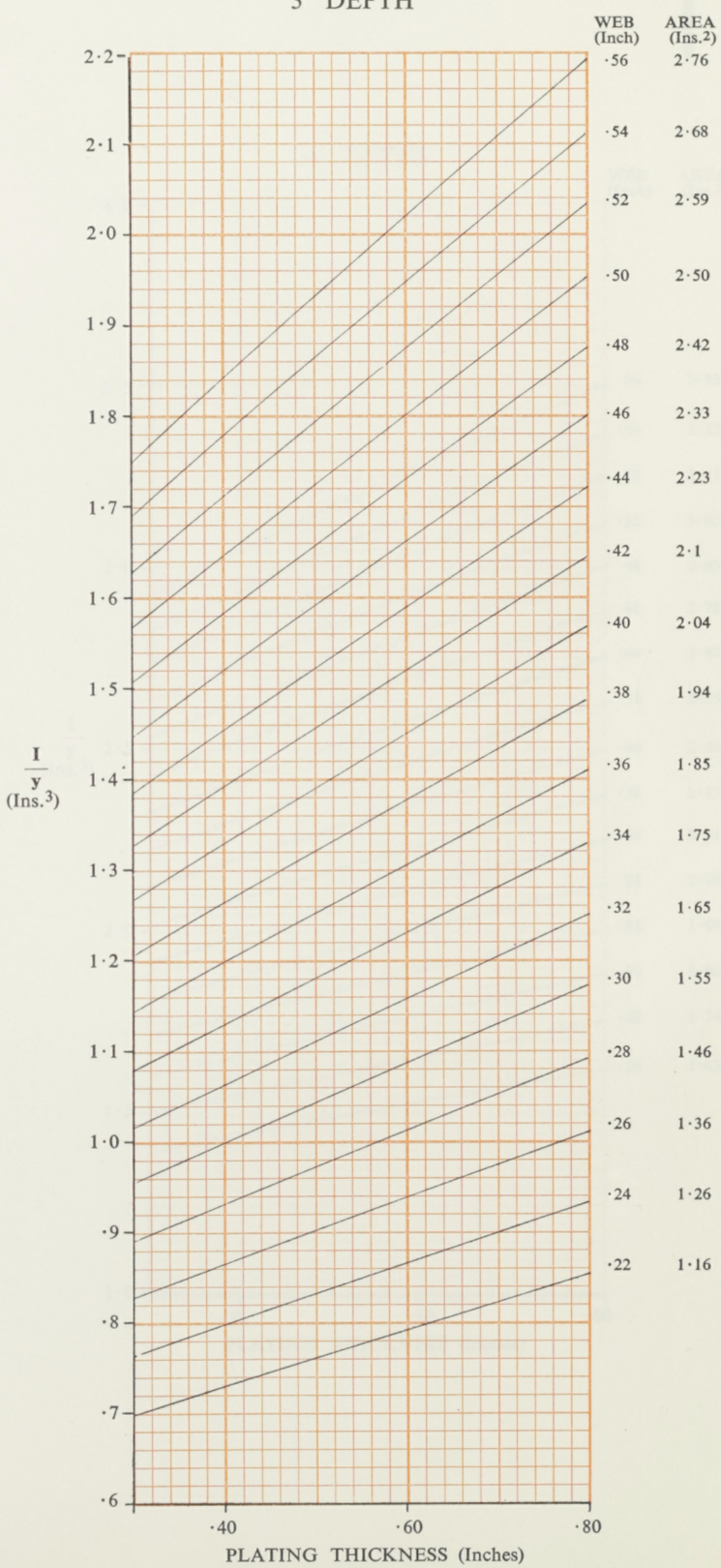
$2\frac{1}{2}''$ FLANGE



$2\frac{1}{2}''$ DEPTH



3″ DEPTH



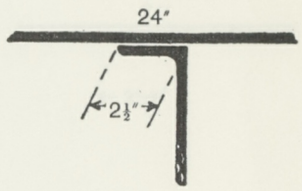
24"
2½"

3" DEPTH
WEB (Inch)
AREA (Ins.²)
PLATING THICKNESS (Inches)

2½" DEPTH
WEB (Inch)
AREA (Ins.²)
PLATING THICKNESS (Inches)

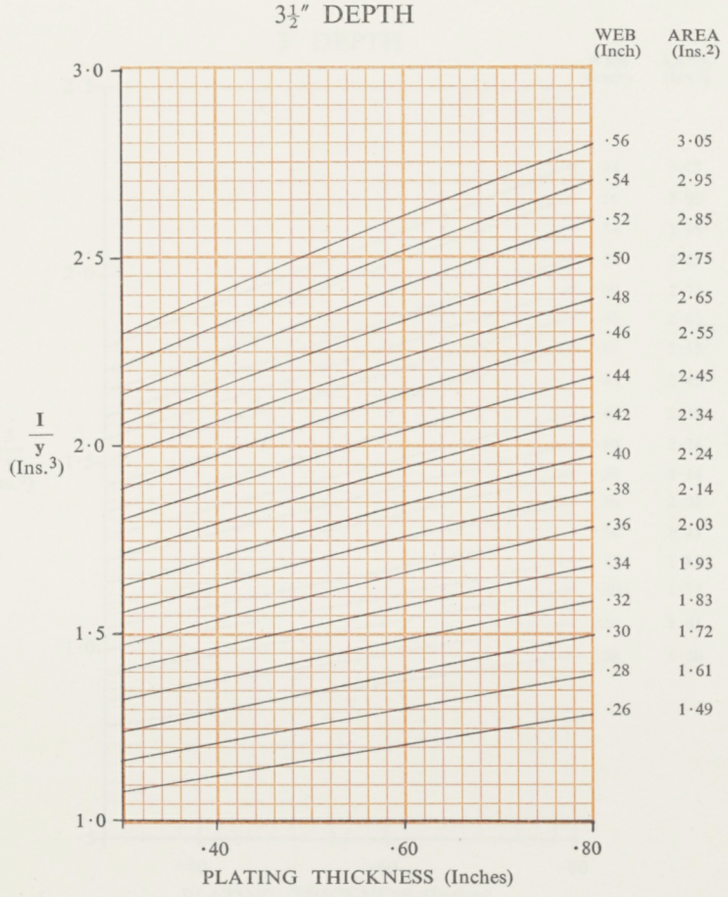
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

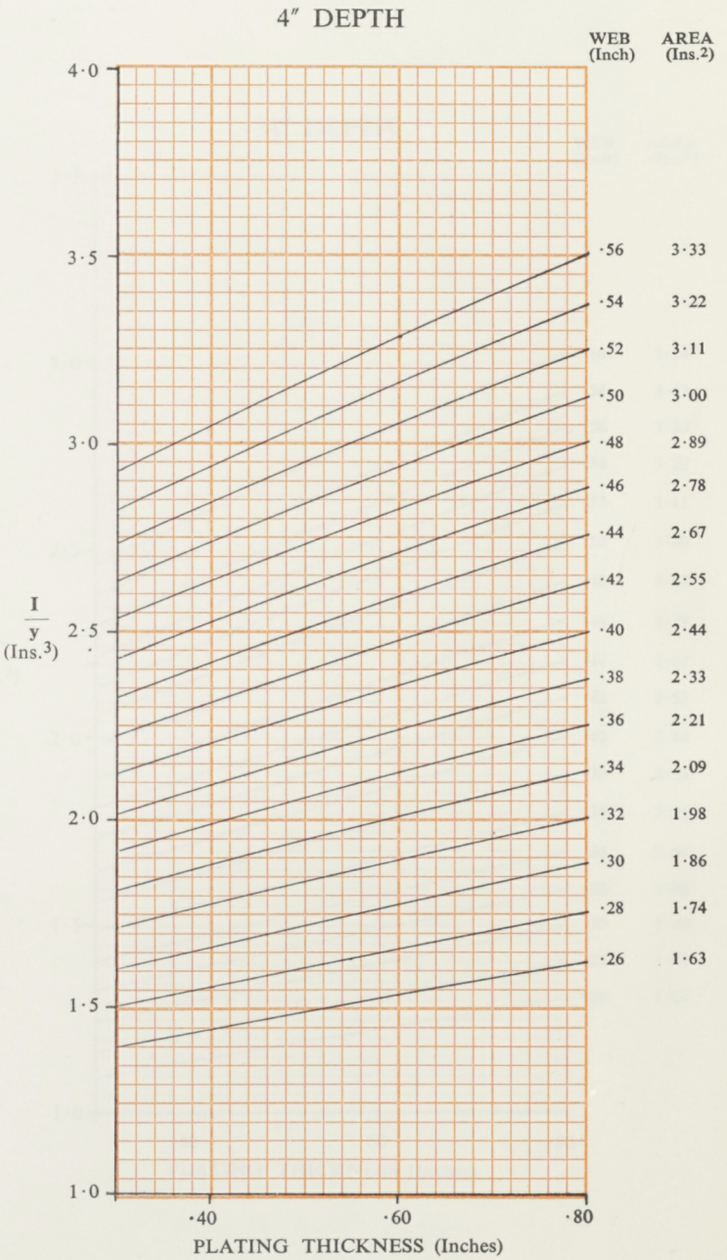


2½″ FLANGE

3½″ DEPTH

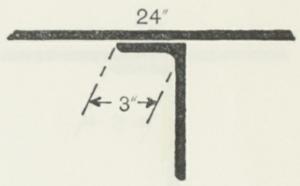


4″ DEPTH



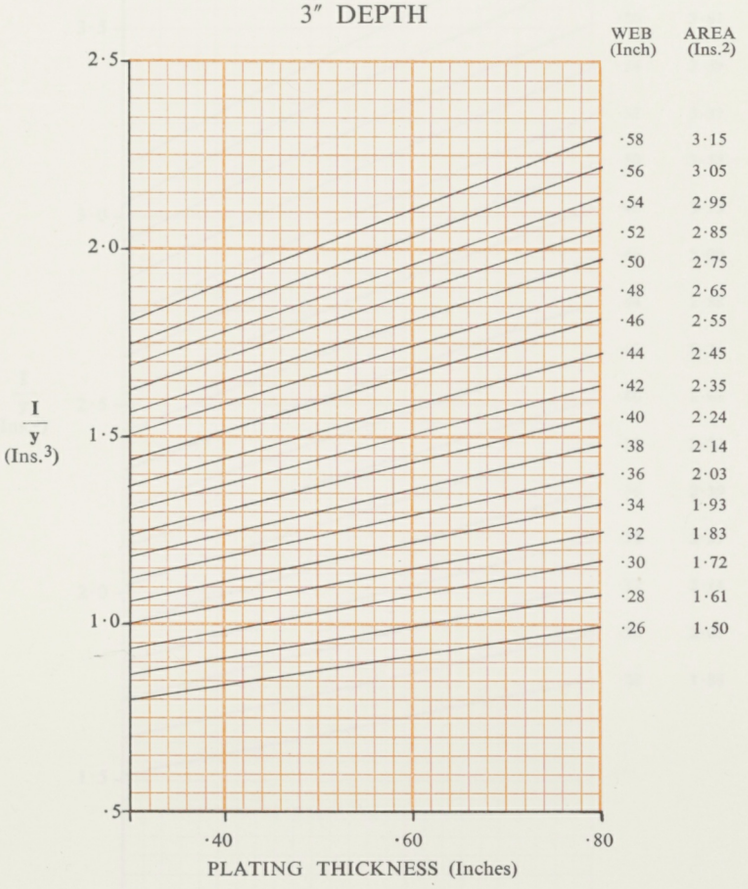
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

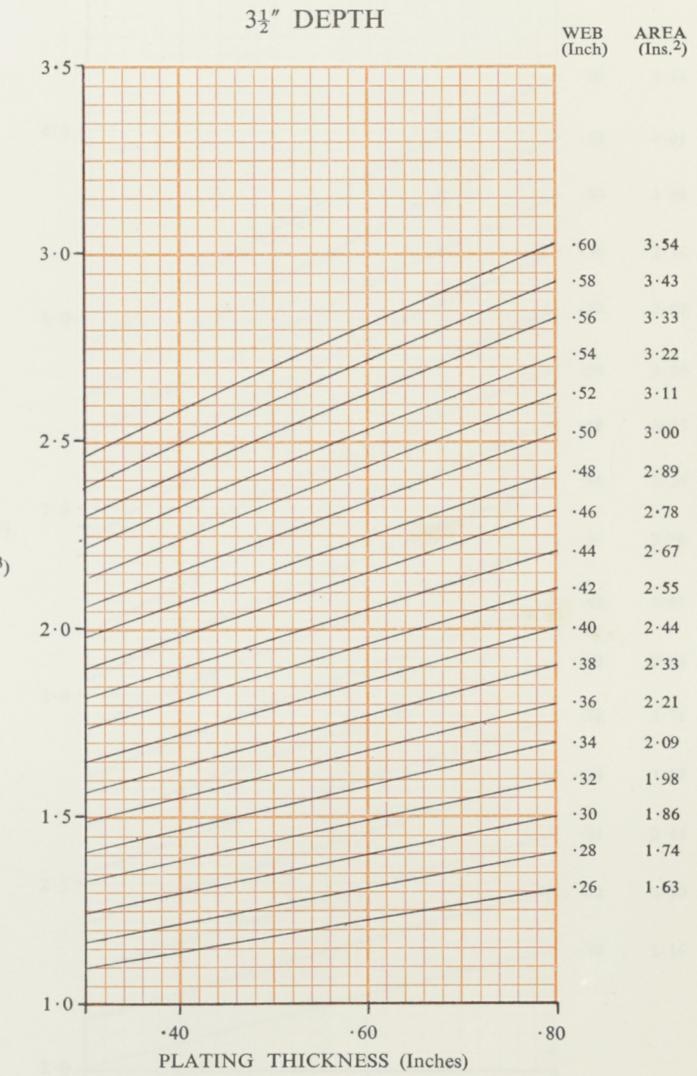


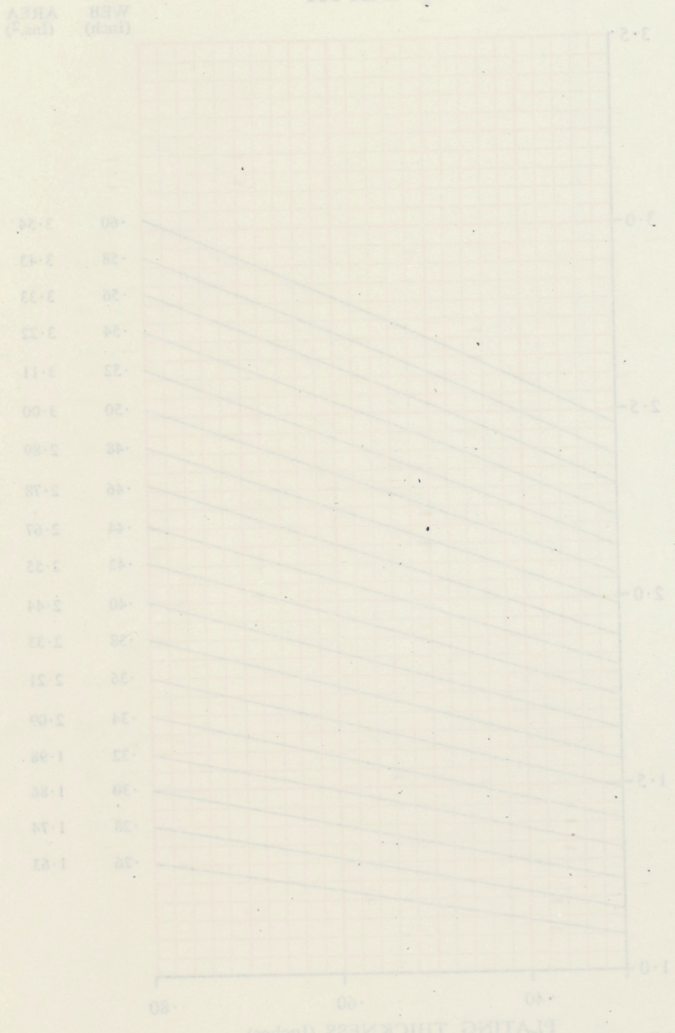
3″ FLANGE

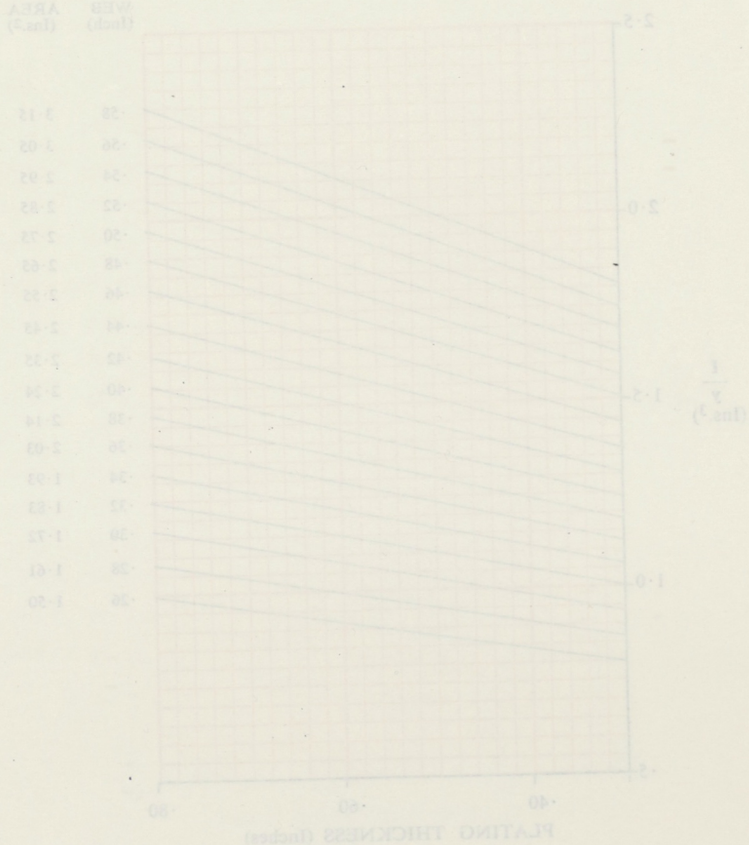
3″ DEPTH



3½″ DEPTH



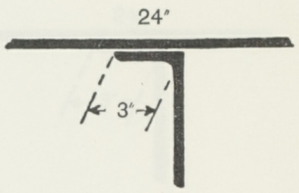




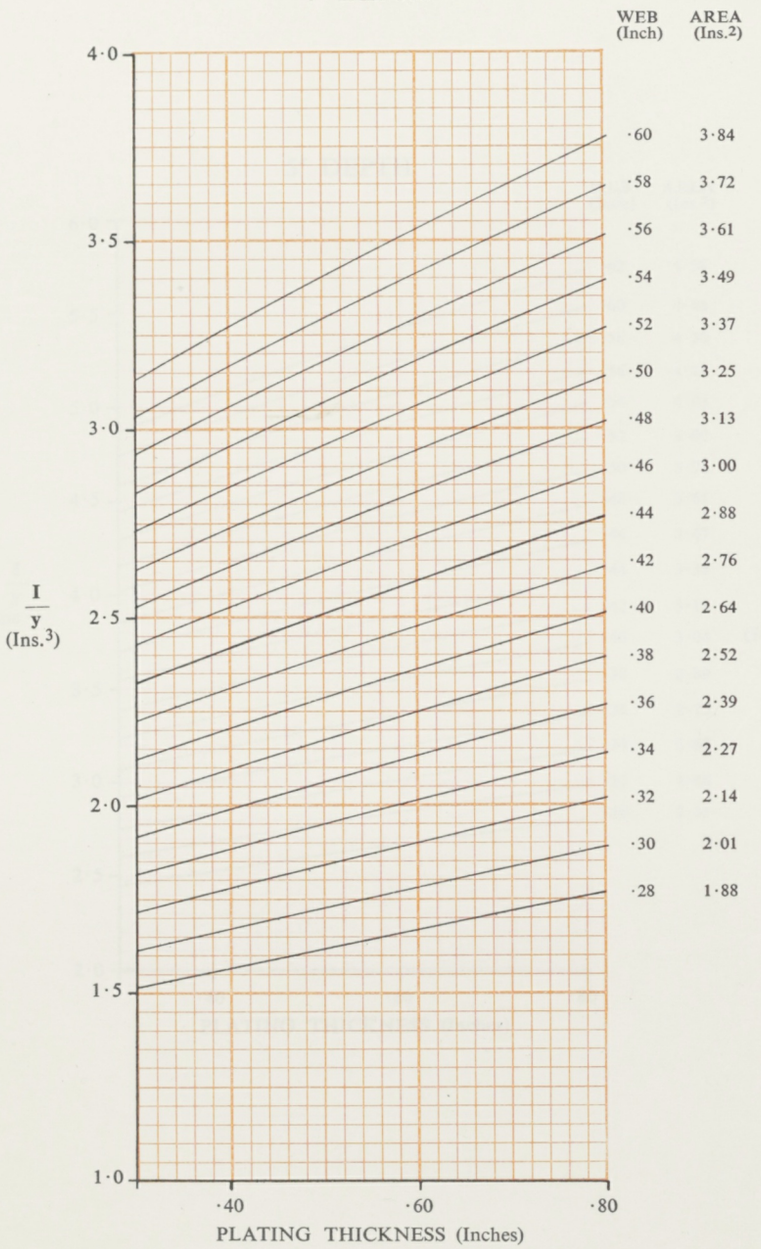
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

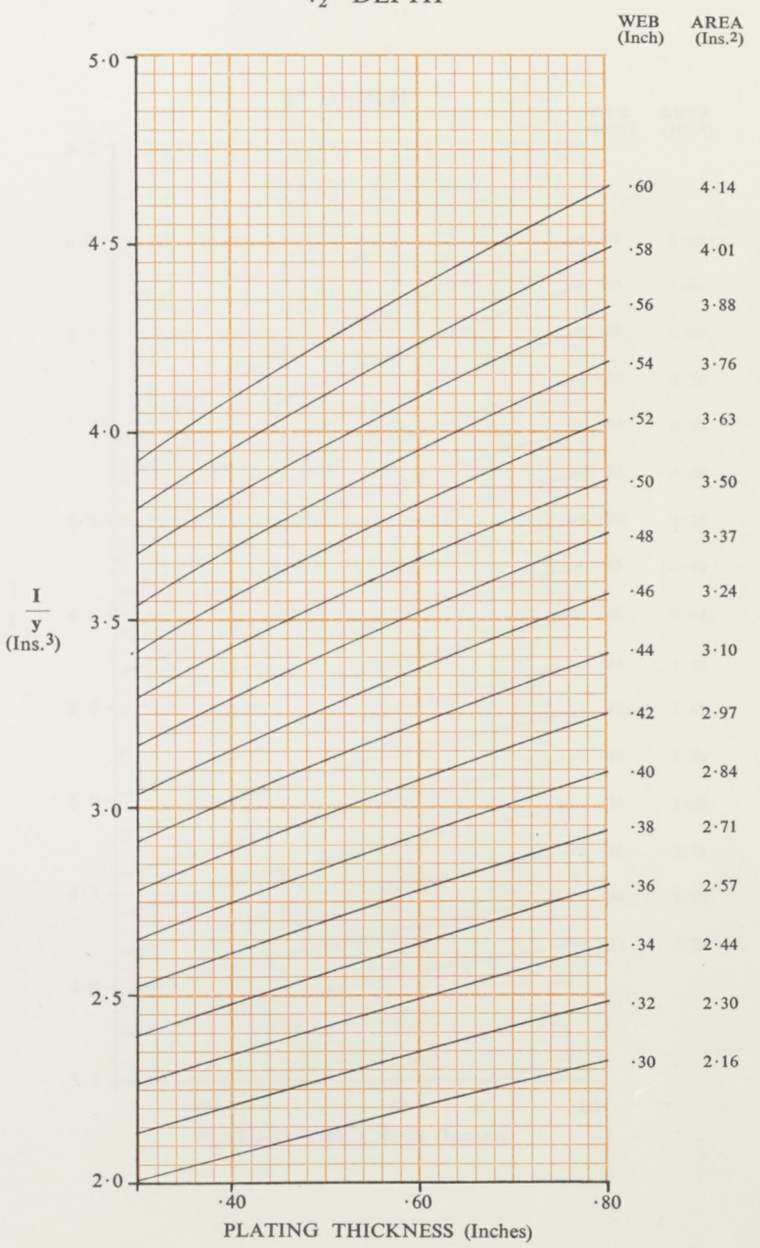
3″ FLANGE

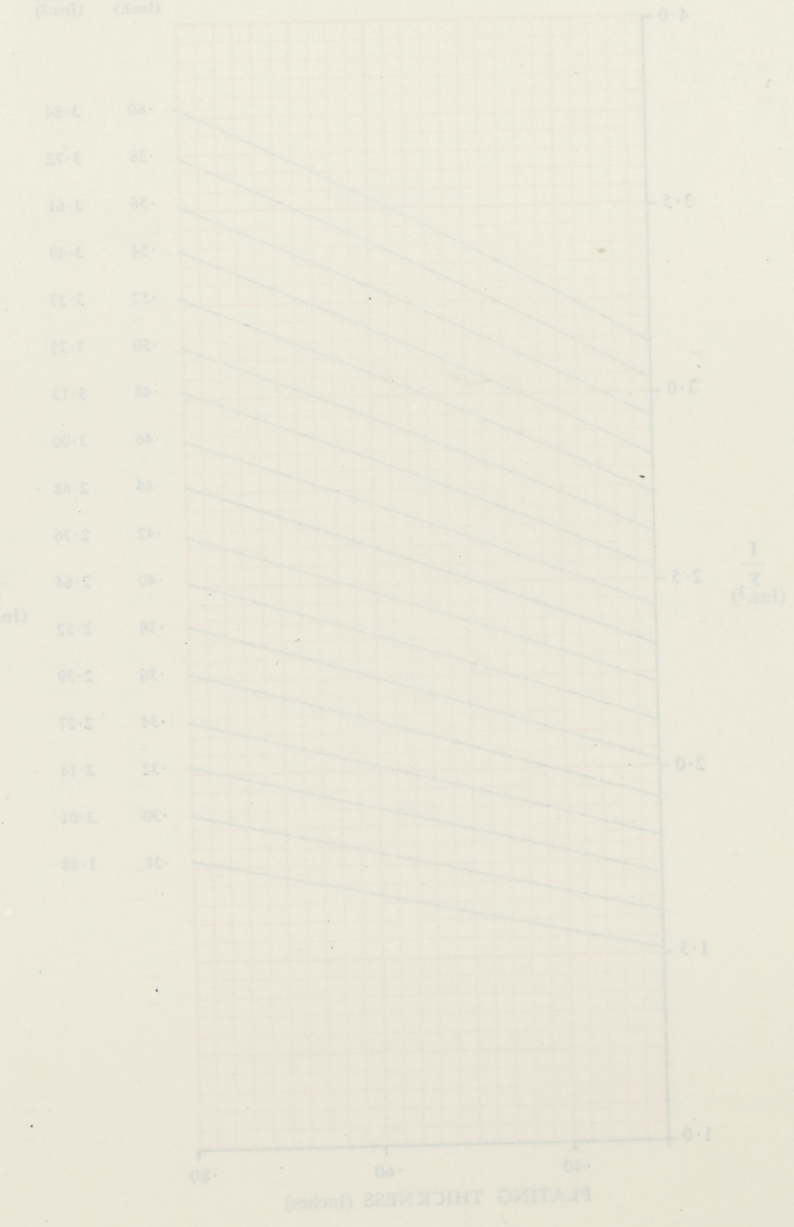


4″ DEPTH



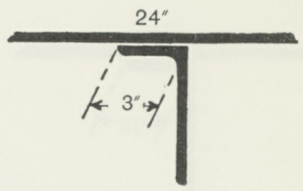
4½″ DEPTH





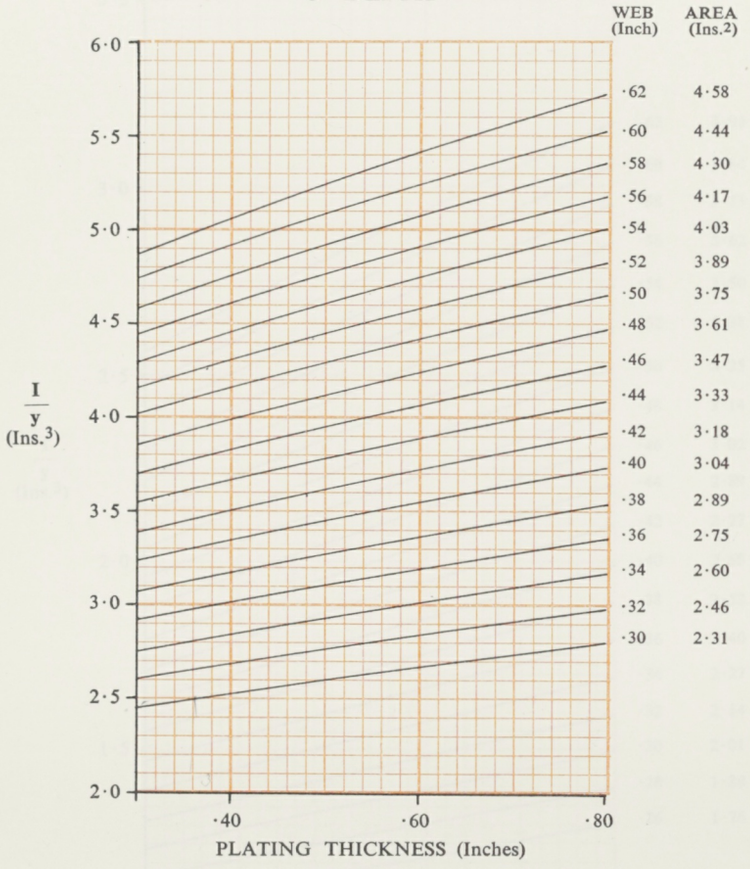
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

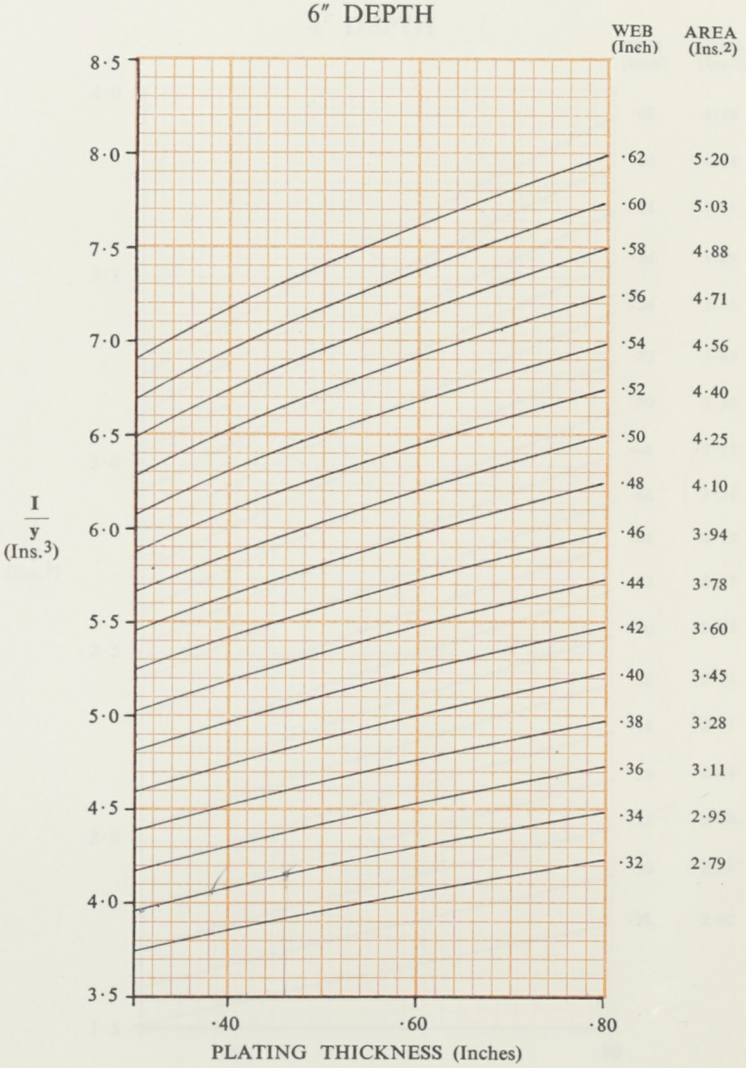


3″ FLANGE

5″ DEPTH

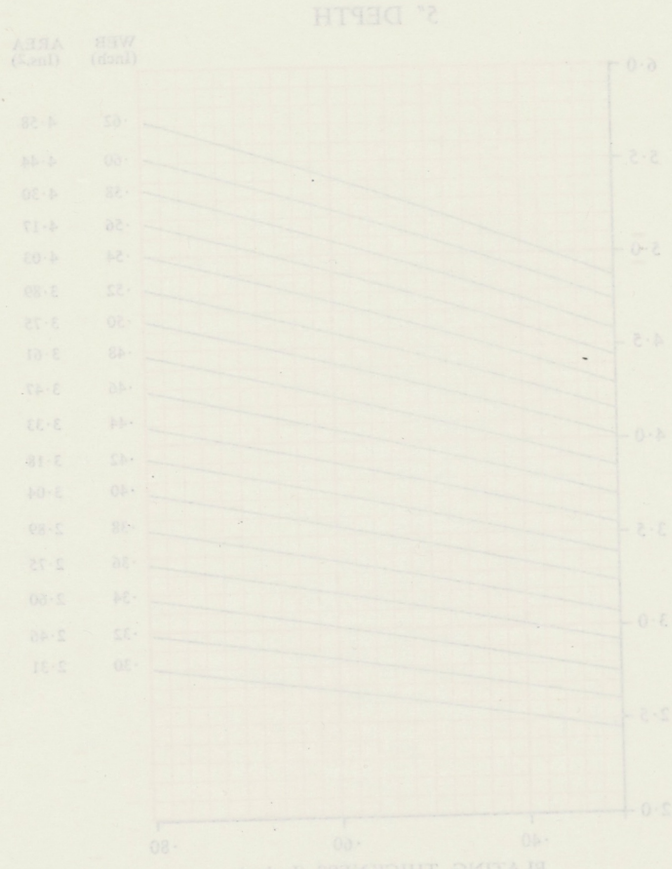


6″ DEPTH



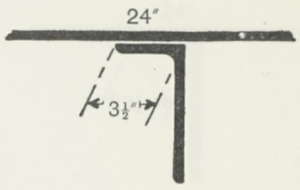
24"
3"
3"

6" DEPTH
WEB (Inch)
AREA (Ins.²)
3·5
3·0
2·5
2·0
1·5
1·0
·60
·50
·40
PLATING THICKNESS (Inches)
I/Y (Ins.³)


5" DEPTH
WEB (Inch)
AREA (Ins.²)
3·5
3·0
2·5
2·0
1·5
1·0
·60
·50
·40
PLATING THICKNESS (Inches)
I/Y (Ins.³)

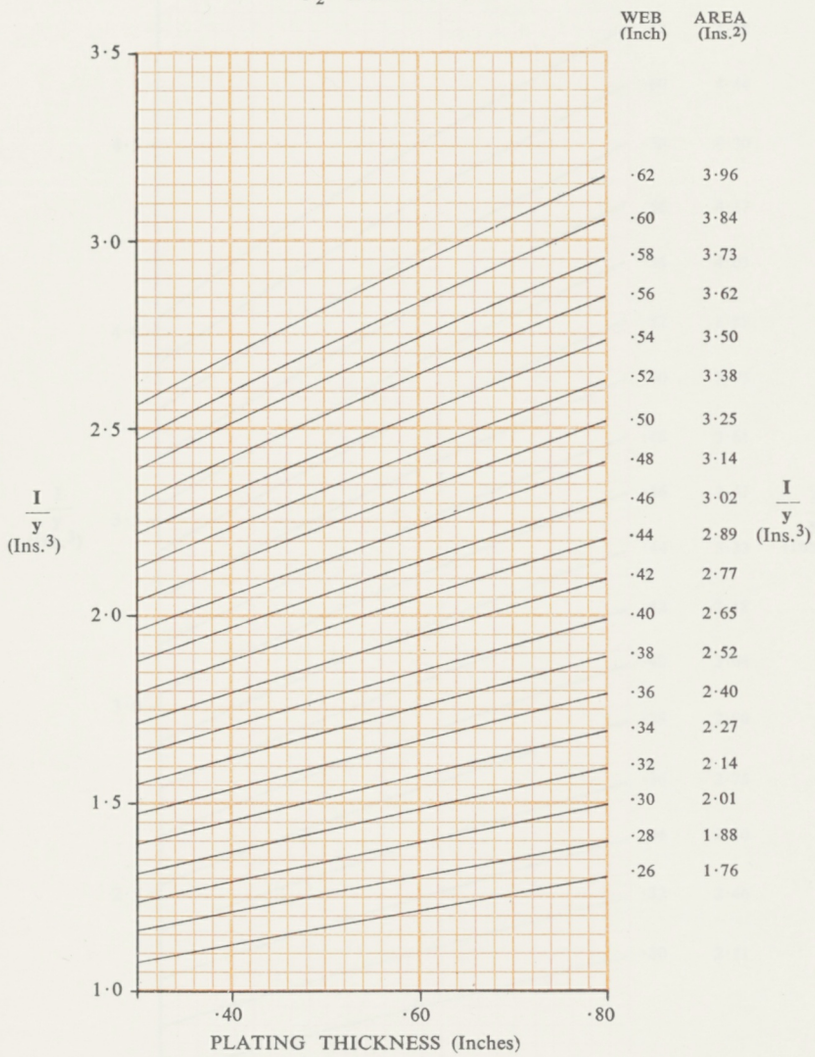
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

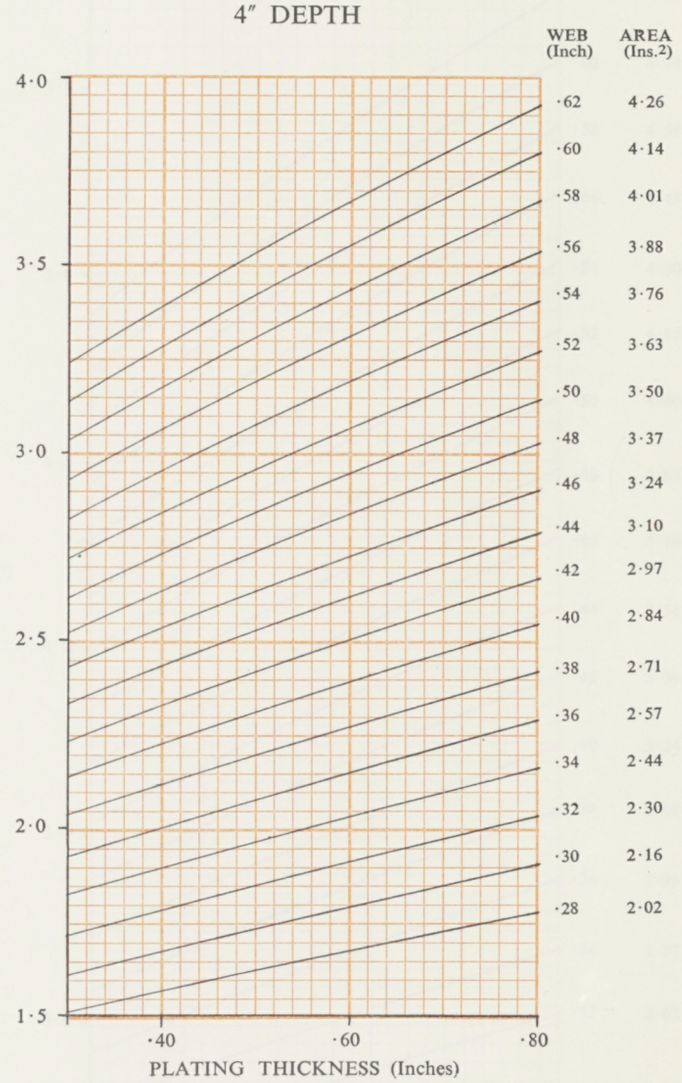


3½″ FLANGE

3½″ DEPTH



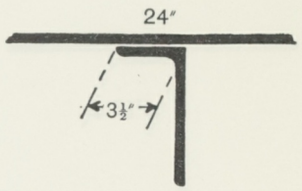
4″ DEPTH



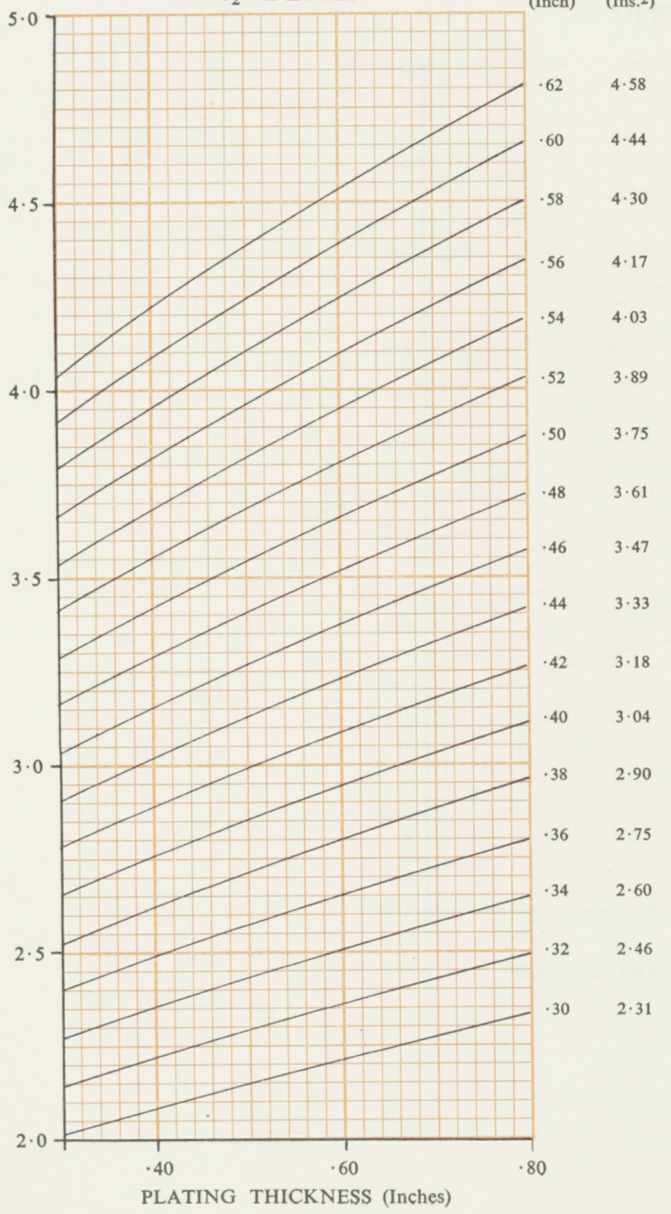
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

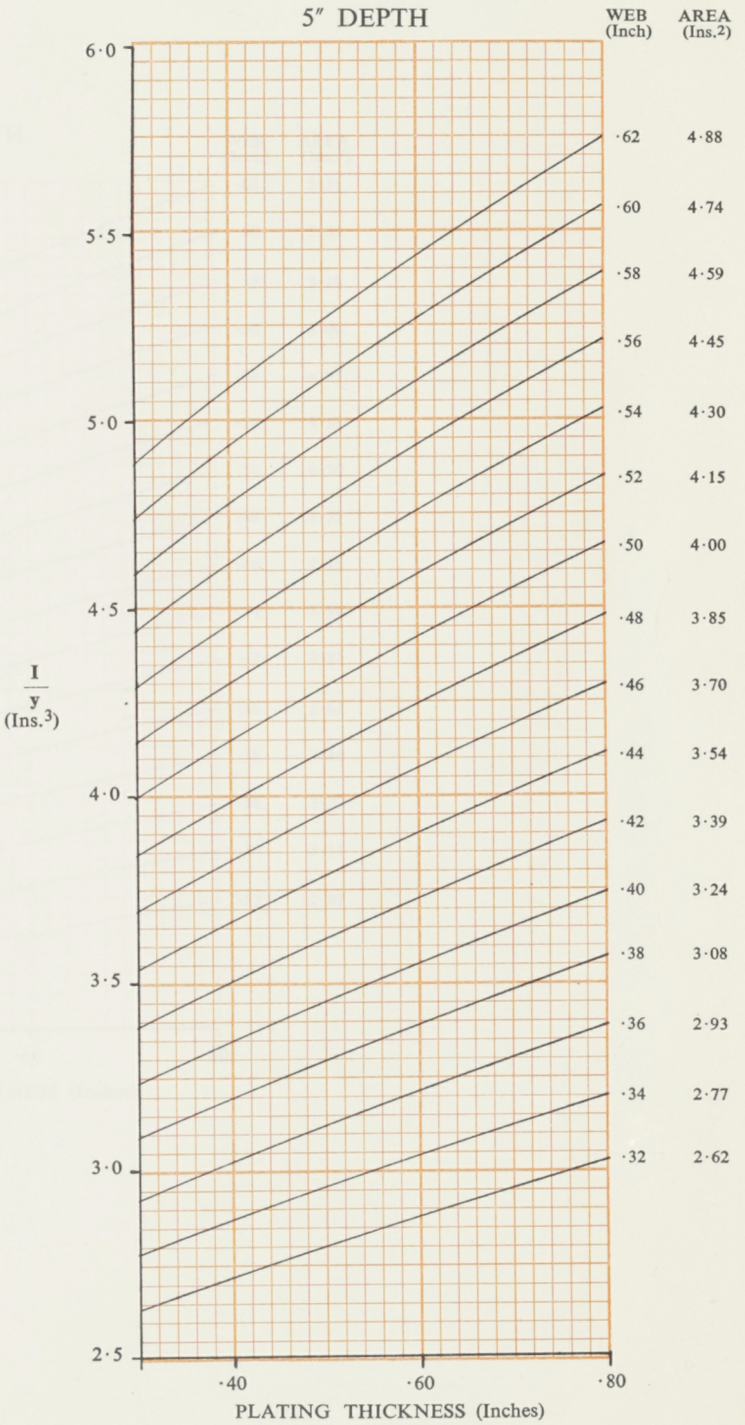
$3\frac{1}{2}''$ FLANGE



$4\frac{1}{2}''$ DEPTH



5″ DEPTH



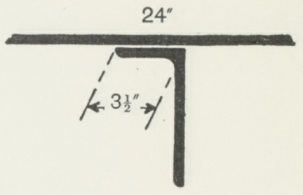
3½"

5" DEPTH
WEB (Inch)
AREA (Inch²)
6·0
5·5
5·0
4·5
4·0
3·5
3·0
2·5
·62 4·88
·60 4·74
·58 4·59
·56 4·45
·54 4·29
·52 4·13
·50 4·00
·48 3·85
·46 3·70
·44 3·54
·42 3·39
·40 3·24
·38 3·08
·36 2·93
·34 2·77
·32 2·62
·60
·40
PLATING THICKNESS (Inches)

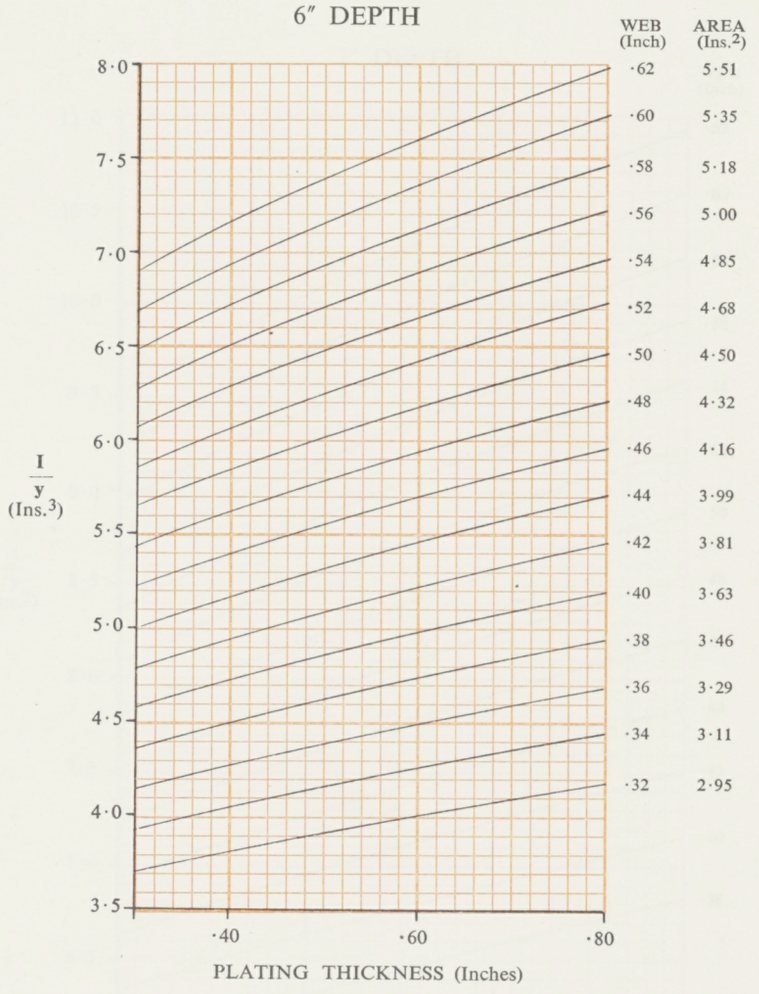
4½" DEPTH
WEB (Inch)
AREA (Inch²)
5·0
4·5
4·0
3·5
3·0
2·5
2·0
·62 4·28
·60 4·14
·58 4·00
·56 4·17
·54 4·03
·52 3·89
·50 3·73
·48 3·61
·46 3·47
·44 3·33
·42 3·18
·40 3·04
·38 2·90
·36 2·75
·34 2·60
·32 2·46
·30 2·31
·60
·40
PLATING THICKNESS (Inches)

SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

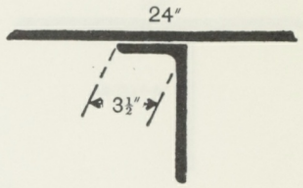


3½″ FLANGE

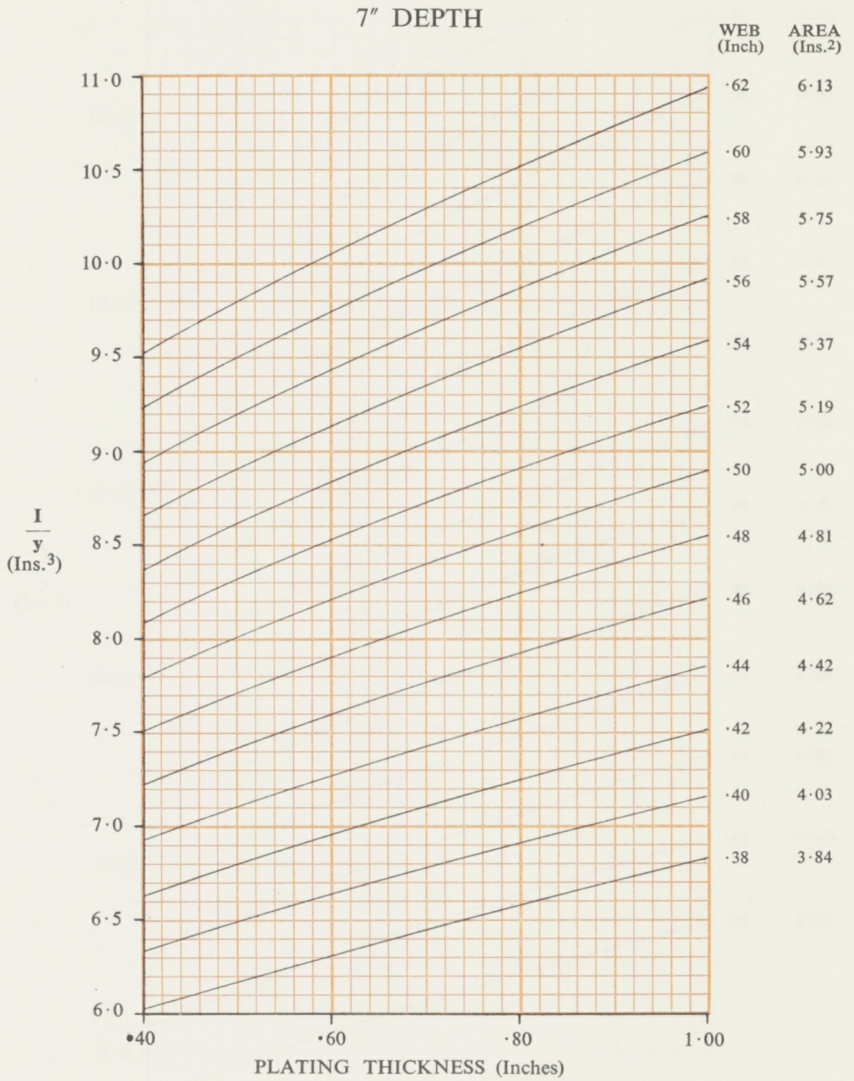


SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



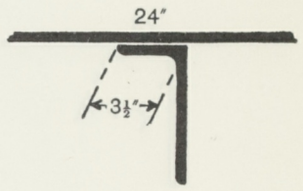
3½″ FLANGE



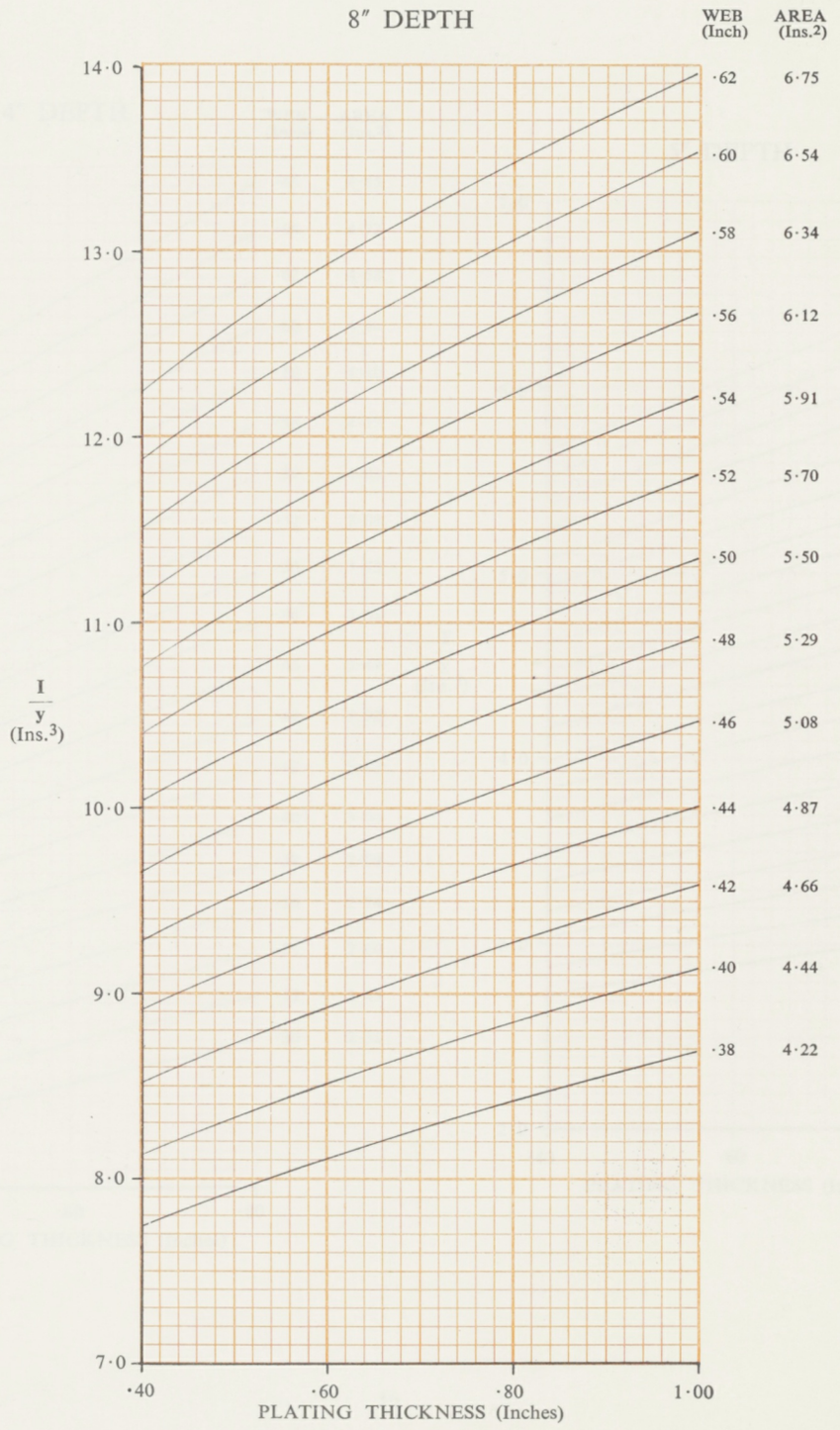
24"
3½"

SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



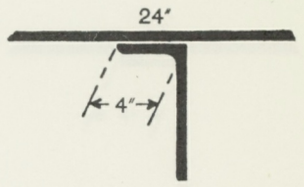
3½″ FLANGE



24"
8½"

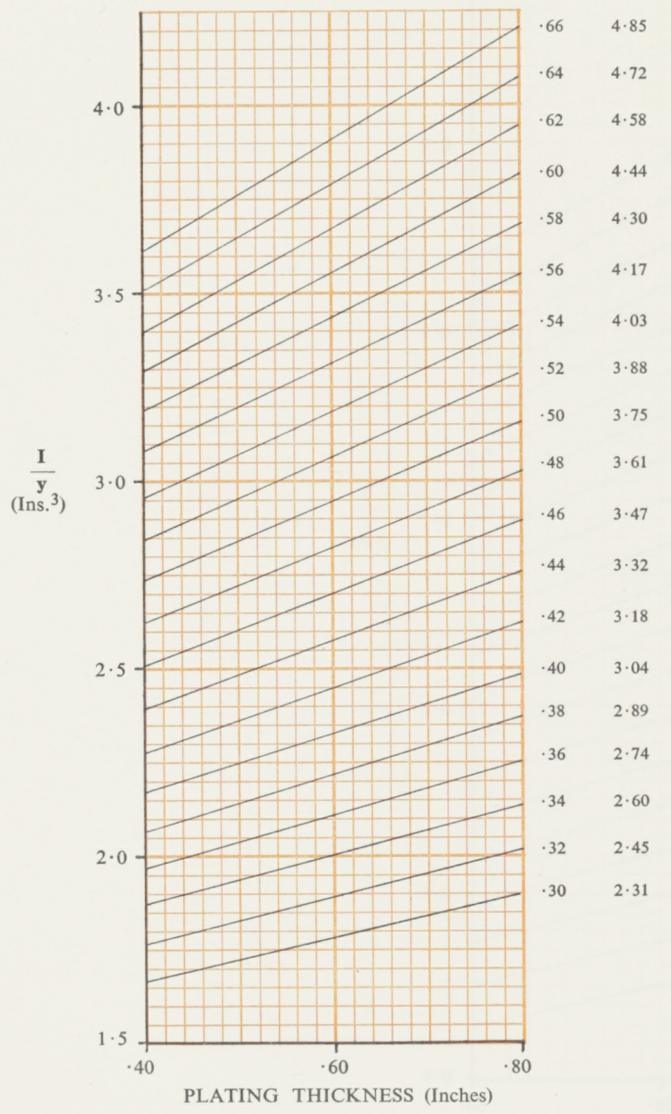
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

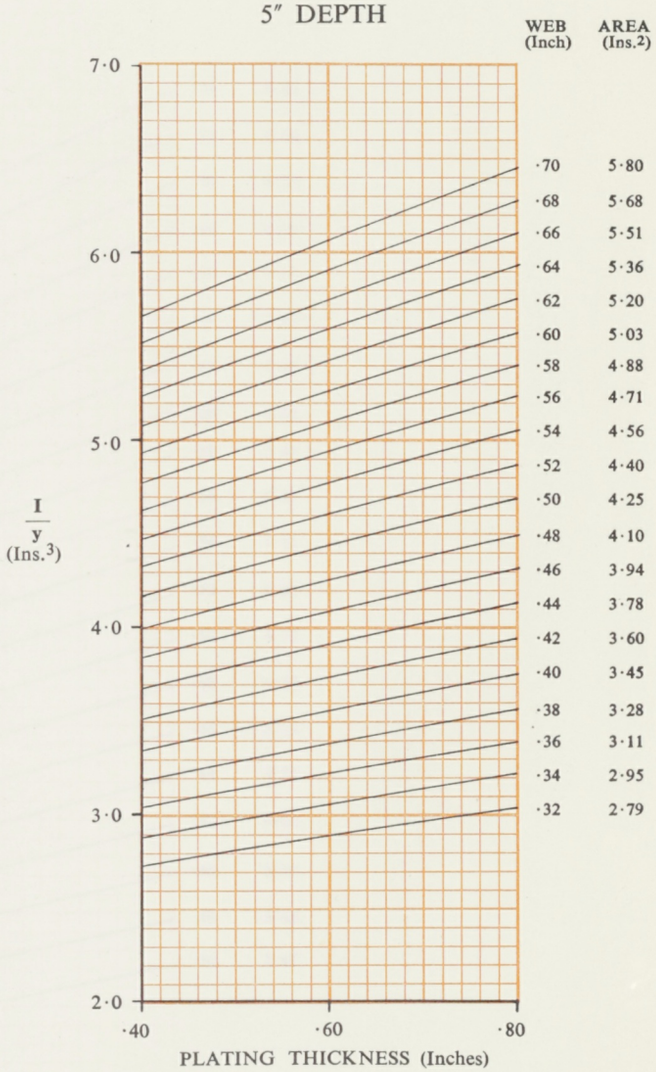


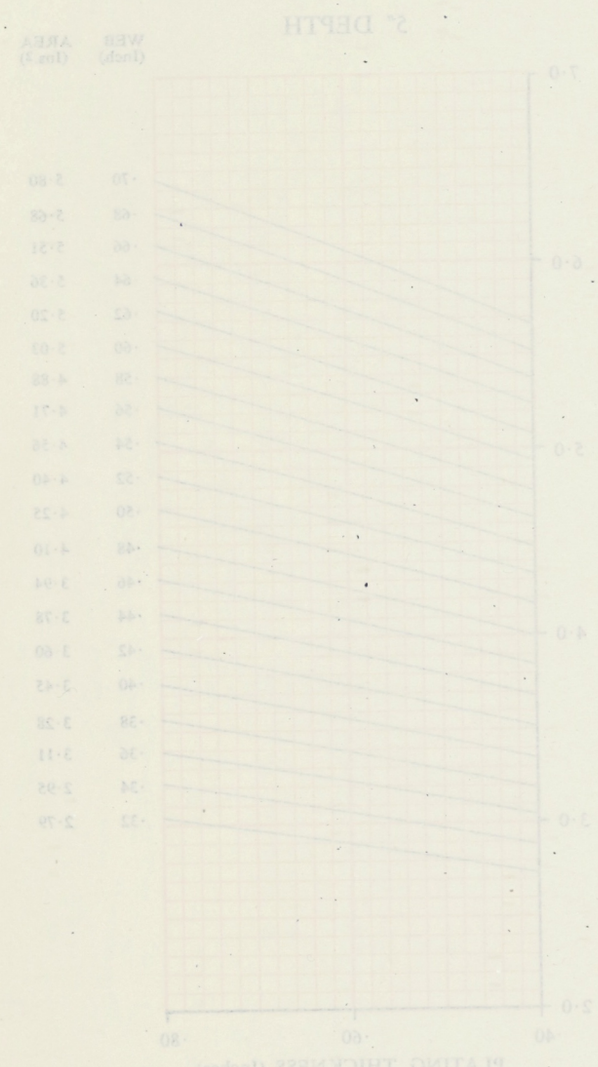
4″ FLANGE

4″ DEPTH



5″ DEPTH

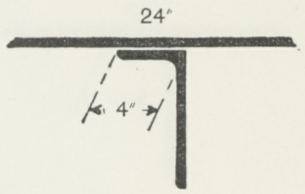



5" DEPTH
WEB (Inch)
AREA (Ins.²)
7·0
6·0
5·0
4·0
3·0
2·0
·70
·60
·50
·40
·30
PLATING THICKNESS (Inches)

4" DEPTH
WEB (Inch)
AREA (Ins.²)
4·0
3·5
3·0
2·5
2·0
·60
·40
PLATING THICKNESS (Inches)

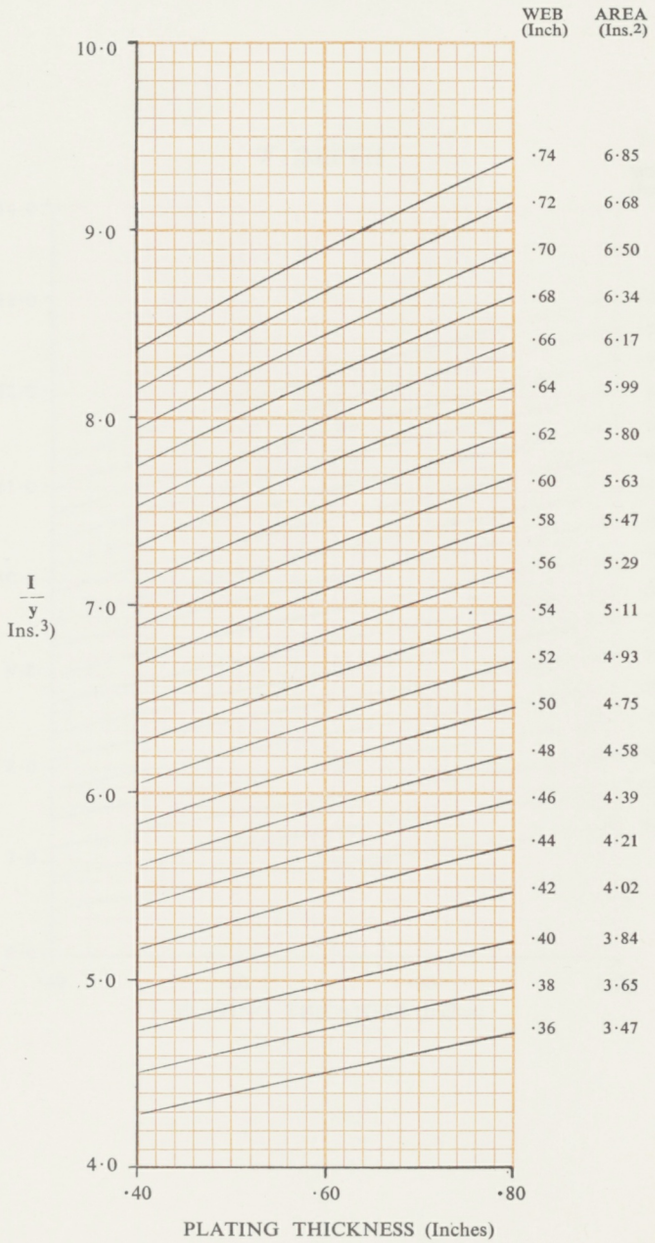
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



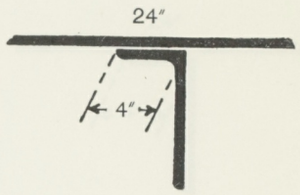
4″ FLANGE

6″ DEPTH



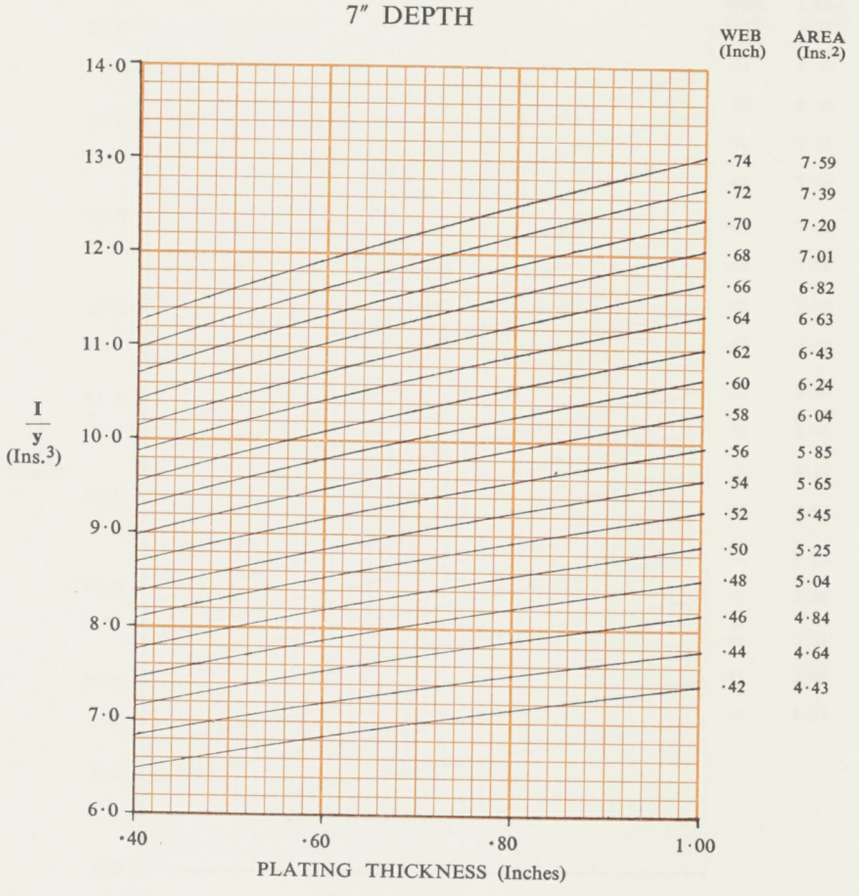
SECTION MODULUS AND AREA OF ORDINARY ANGLES

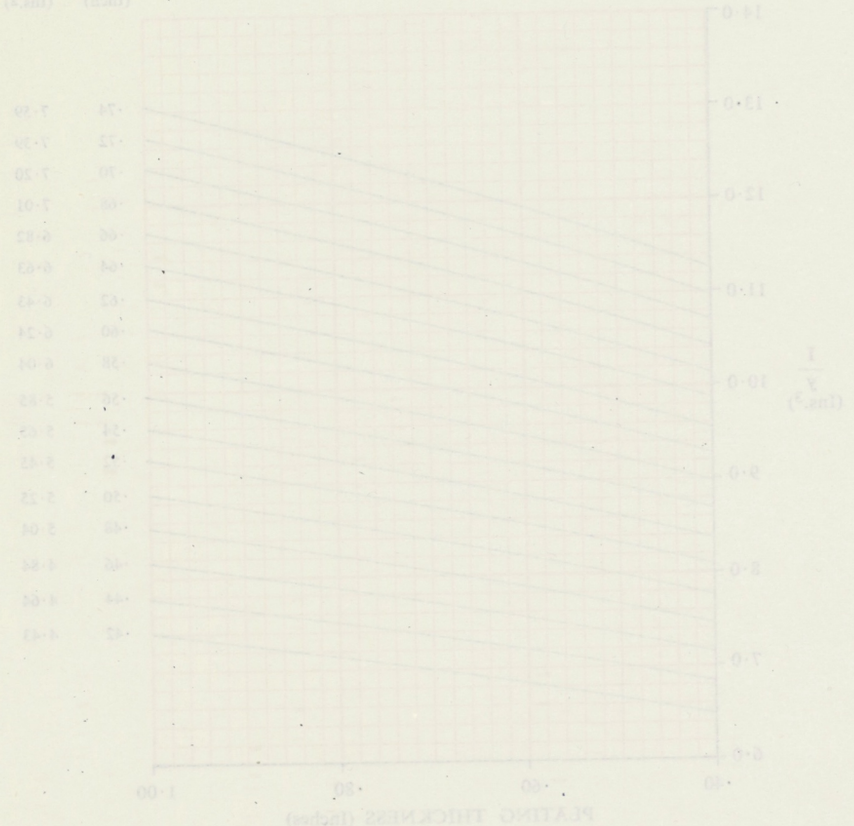
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

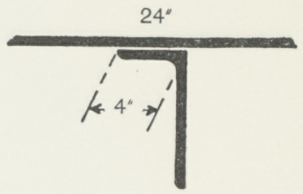
7″ DEPTH



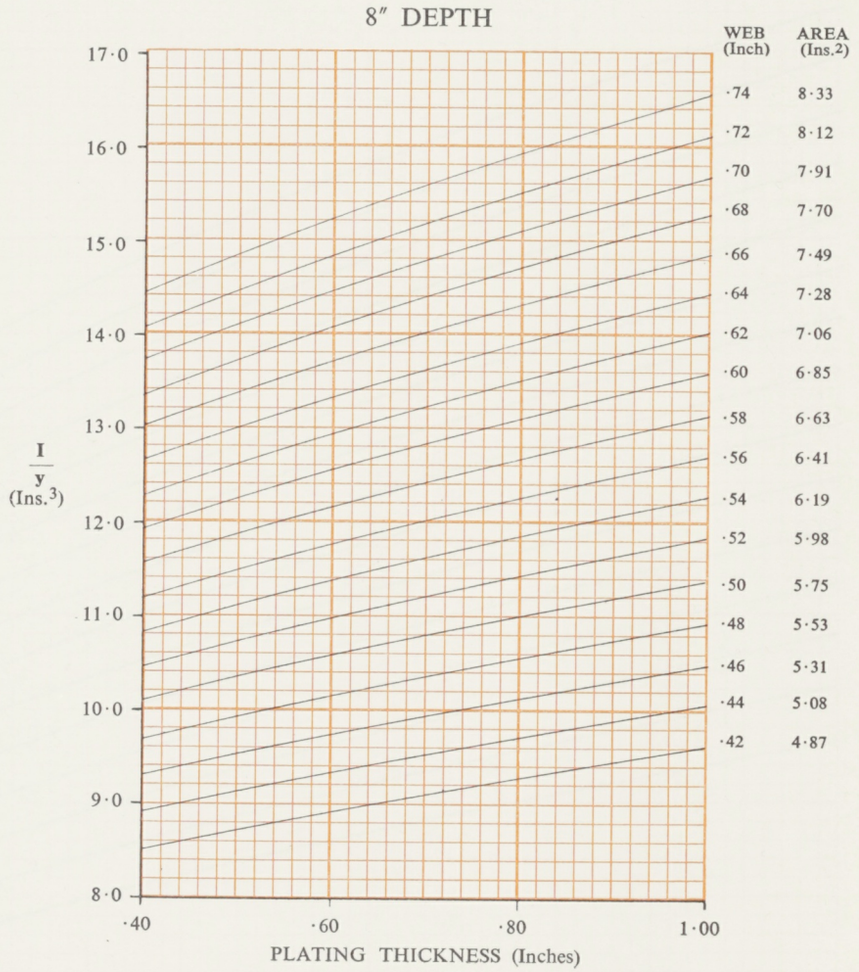


SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

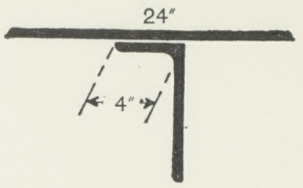


24"
4"
4"

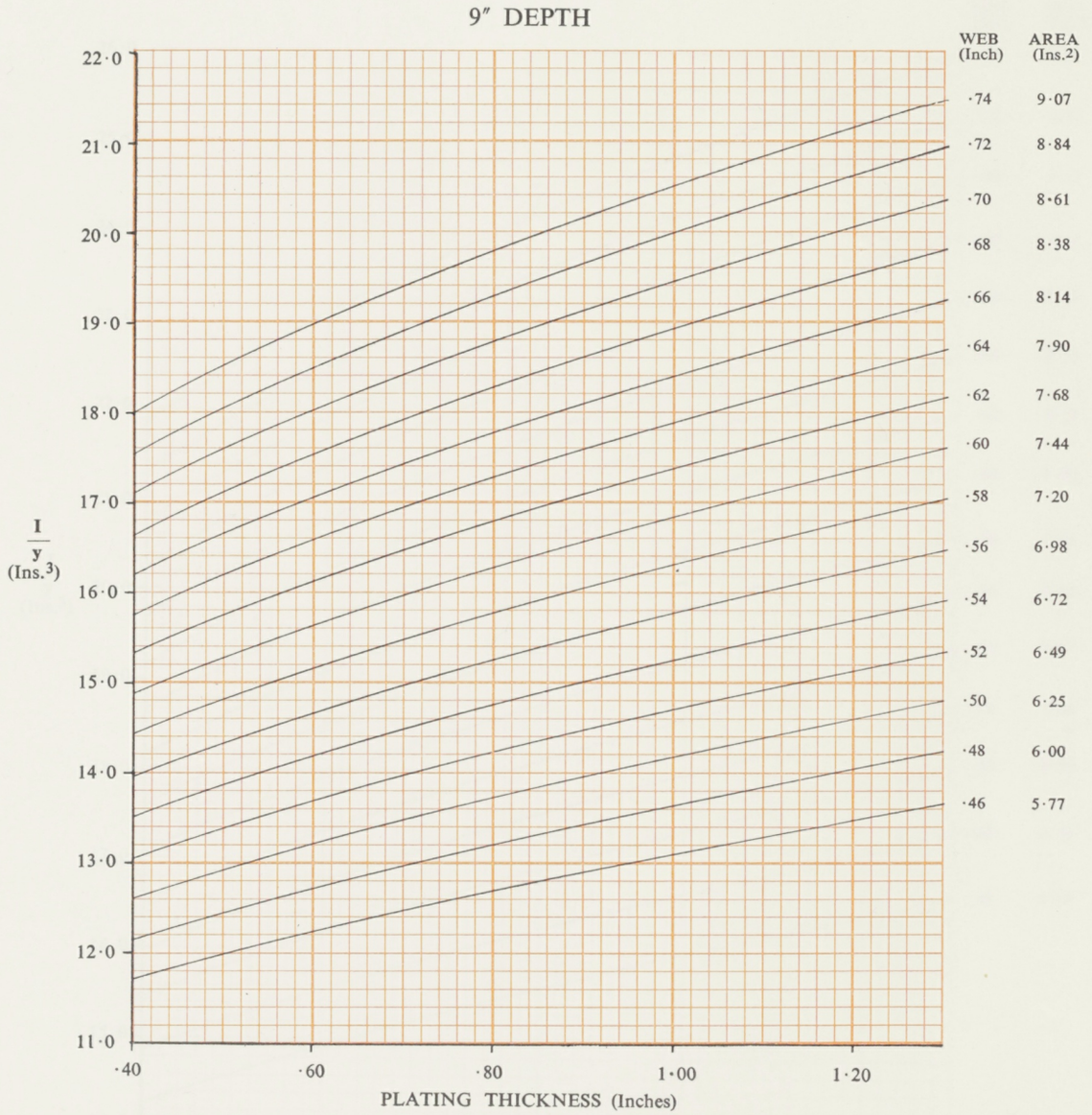
WEB (Inch)
AREA (Inch²)
17·0
16·0
15·0
14·0
13·0
12·0
11·0
10·0
9·0
8·0
·74 8·13
·72 8·01
·70 7·91
·68 7·80
·66 7·70
·64 7·59
·62 7·49
·60 7·38
·58 6·83
·56 6·72
·54 6·61
·52 6·51
·50 6·40
·48 3·96
·46 3·85
·44 3·75
·42 3·64
·40 3·54
·38 3·43
·36 3·33
·34 3·22
·32 3·12
·30 3·01
·28 2·91
·26 2·80
·24 2·69
·22 2·59
·20 2·48
·18 2·38
·16 2·27
·14 2·17
·12 2·06
·10 1·96
·08 1·85
·06 1·75
·04 1·64
·02 1·54
·00 1·43
·60
·80
1·00
PLATING THICKNESS (Inches)
I/y (Inch³)

SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

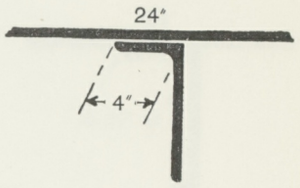


4″ FLANGE



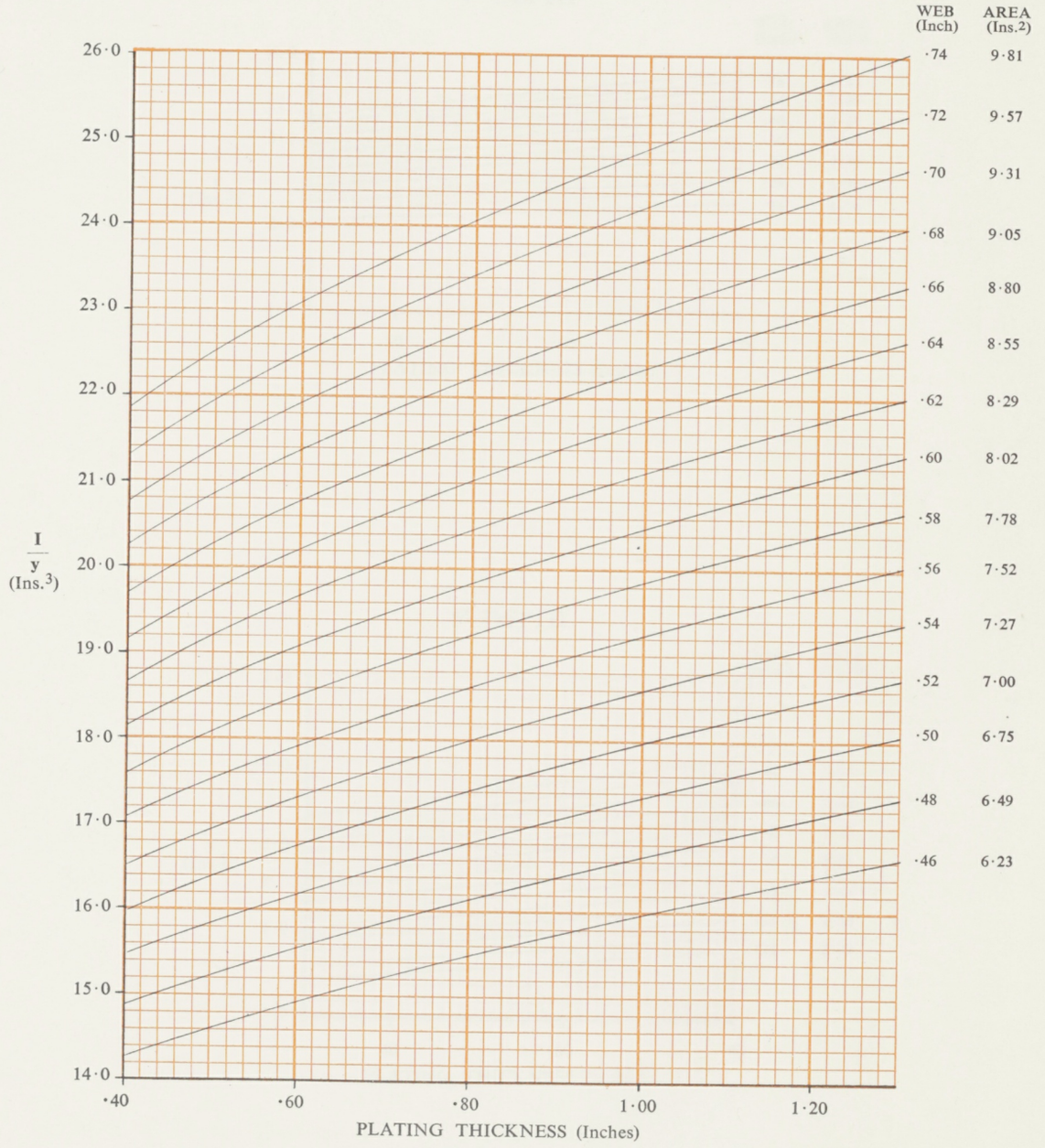
SECTION MODULUS AND AREA OF ORDINARY ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



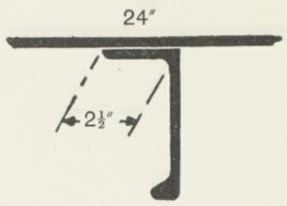
4″ FLANGE

10″ DEPTH



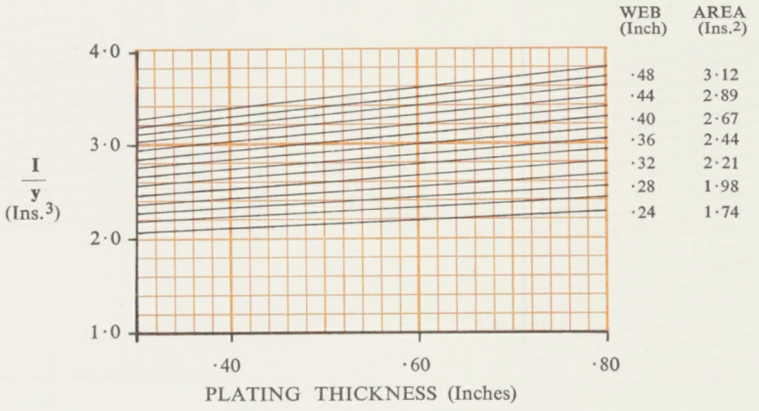
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

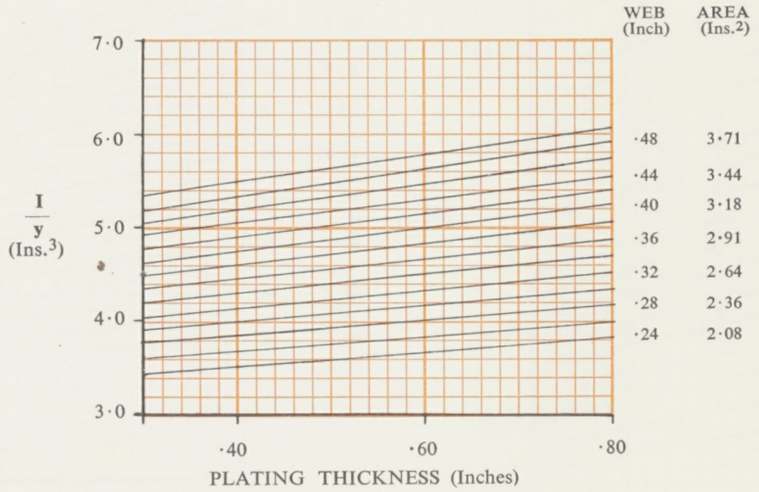


2½″ FLANGE

4″ DEPTH

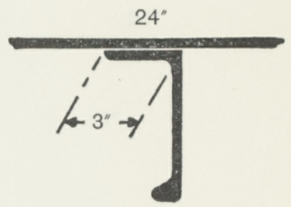


5″ DEPTH



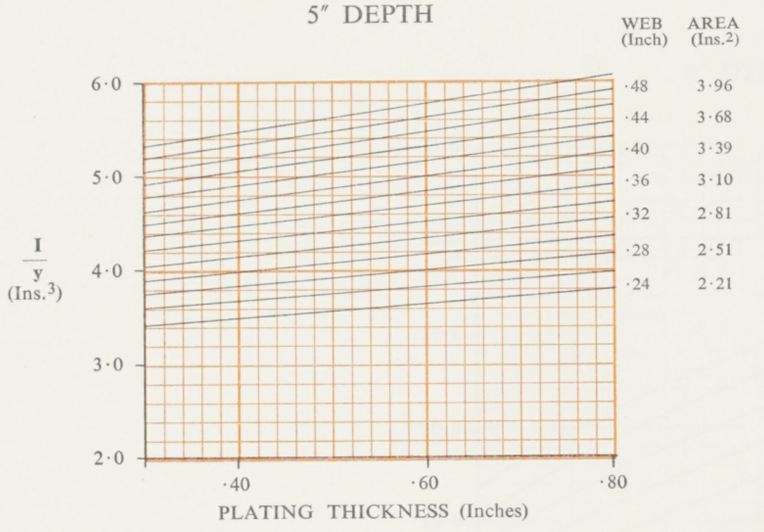
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

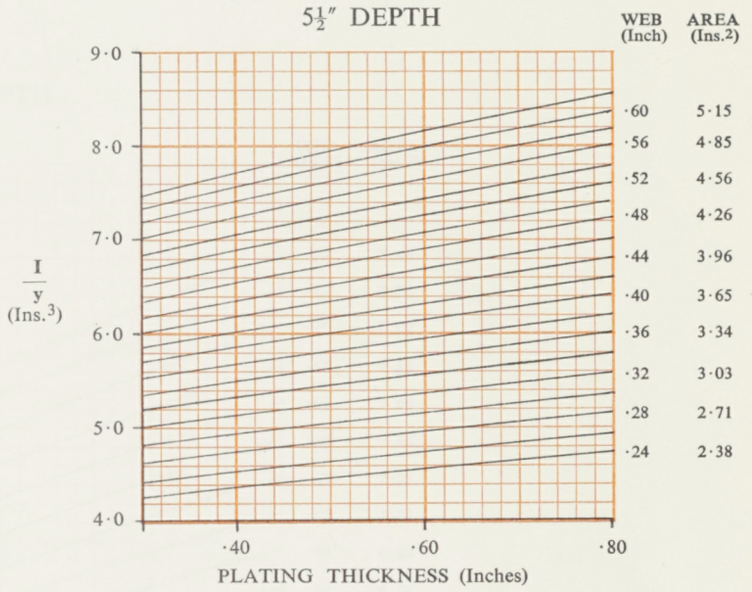


3″ FLANGE

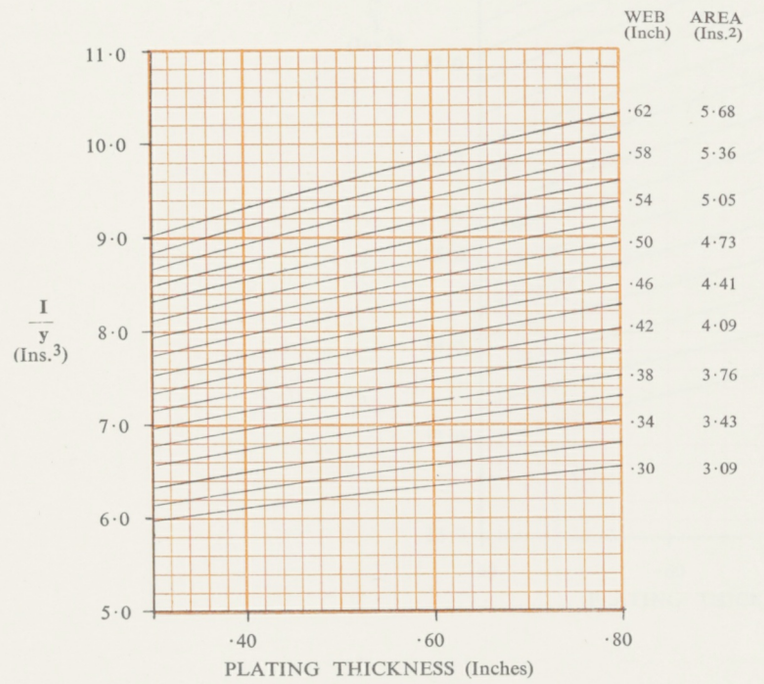
5″ DEPTH



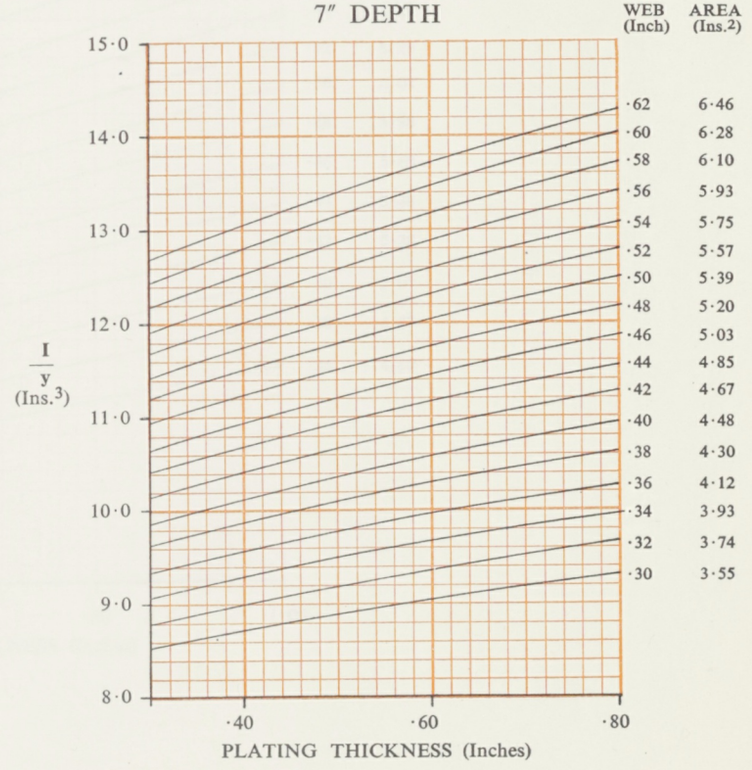
5½″ DEPTH



6″ DEPTH

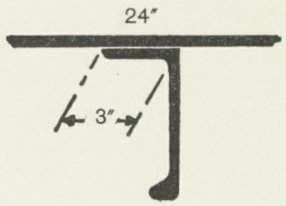


7″ DEPTH



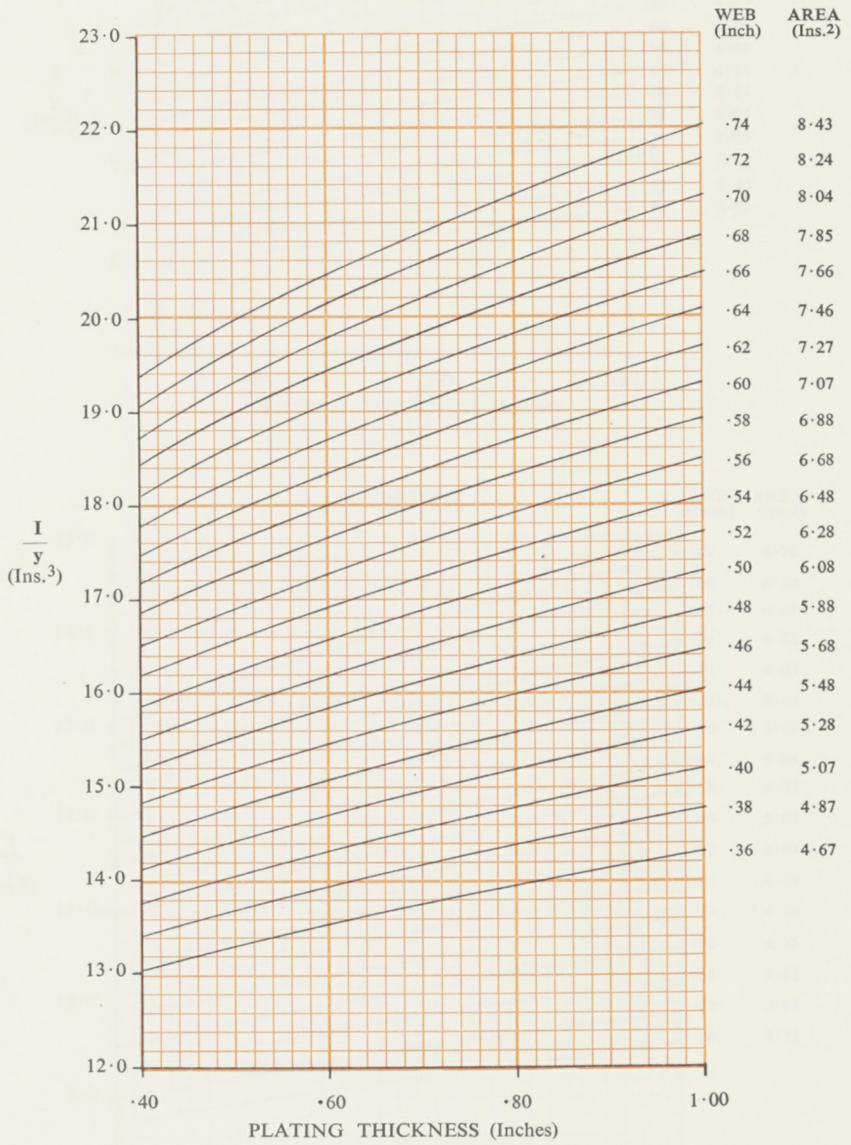
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



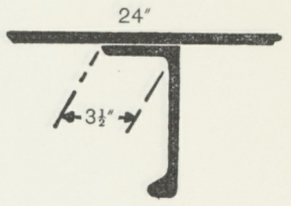
3″ FLANGE

8″ DEPTH



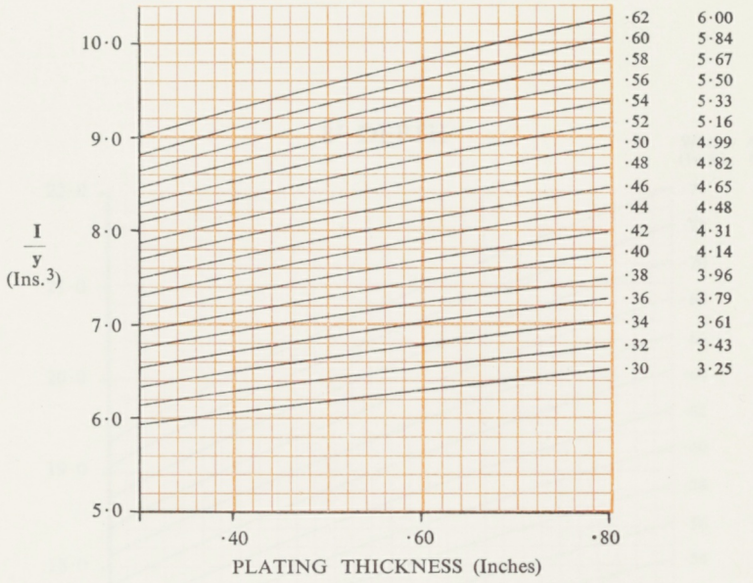
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

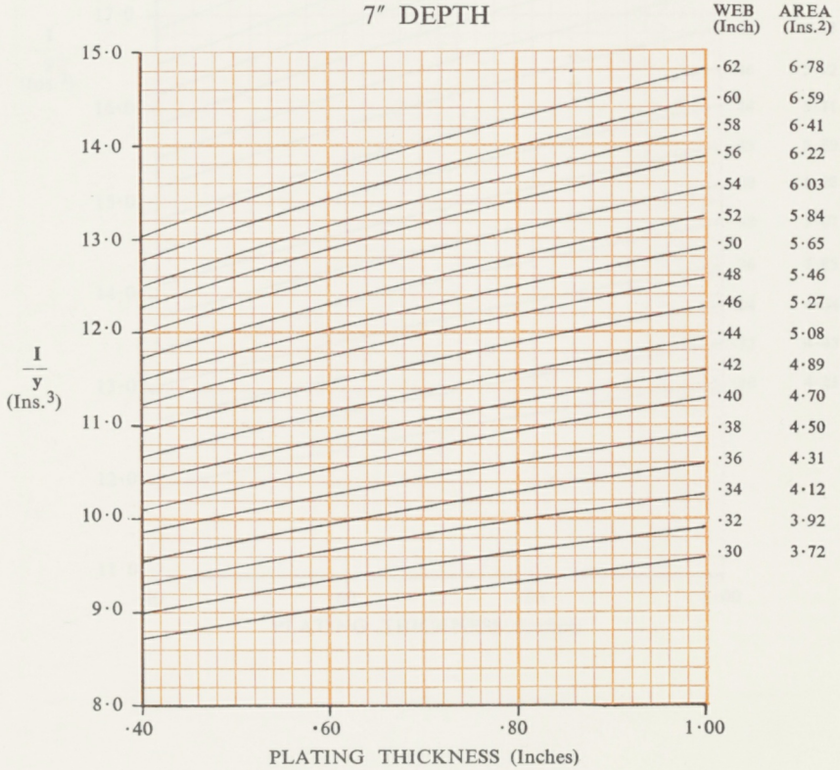


3½″ FLANGE

6″ DEPTH



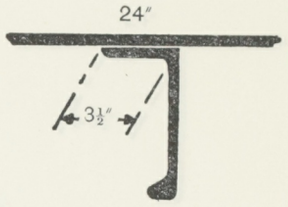
7″ DEPTH



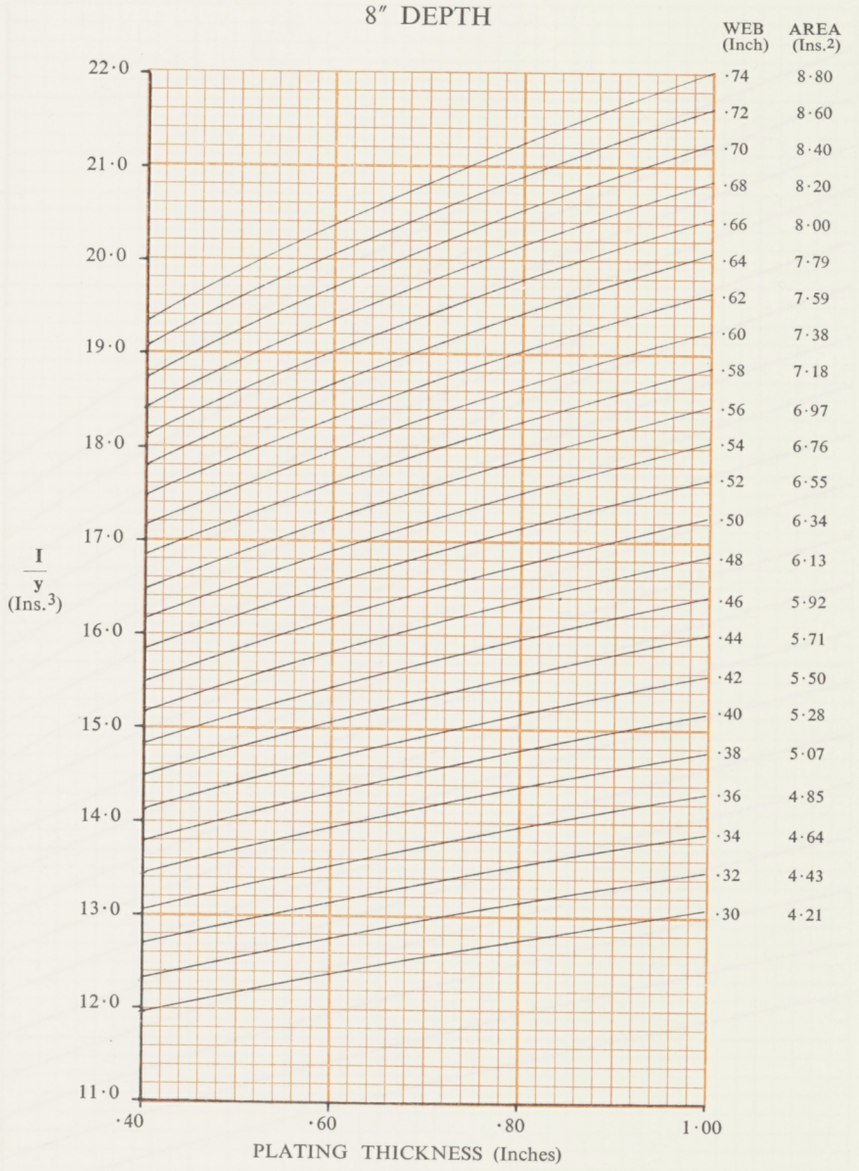
24"
3½"

SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

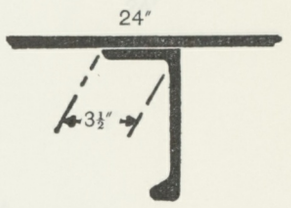


3½″ FLANGE



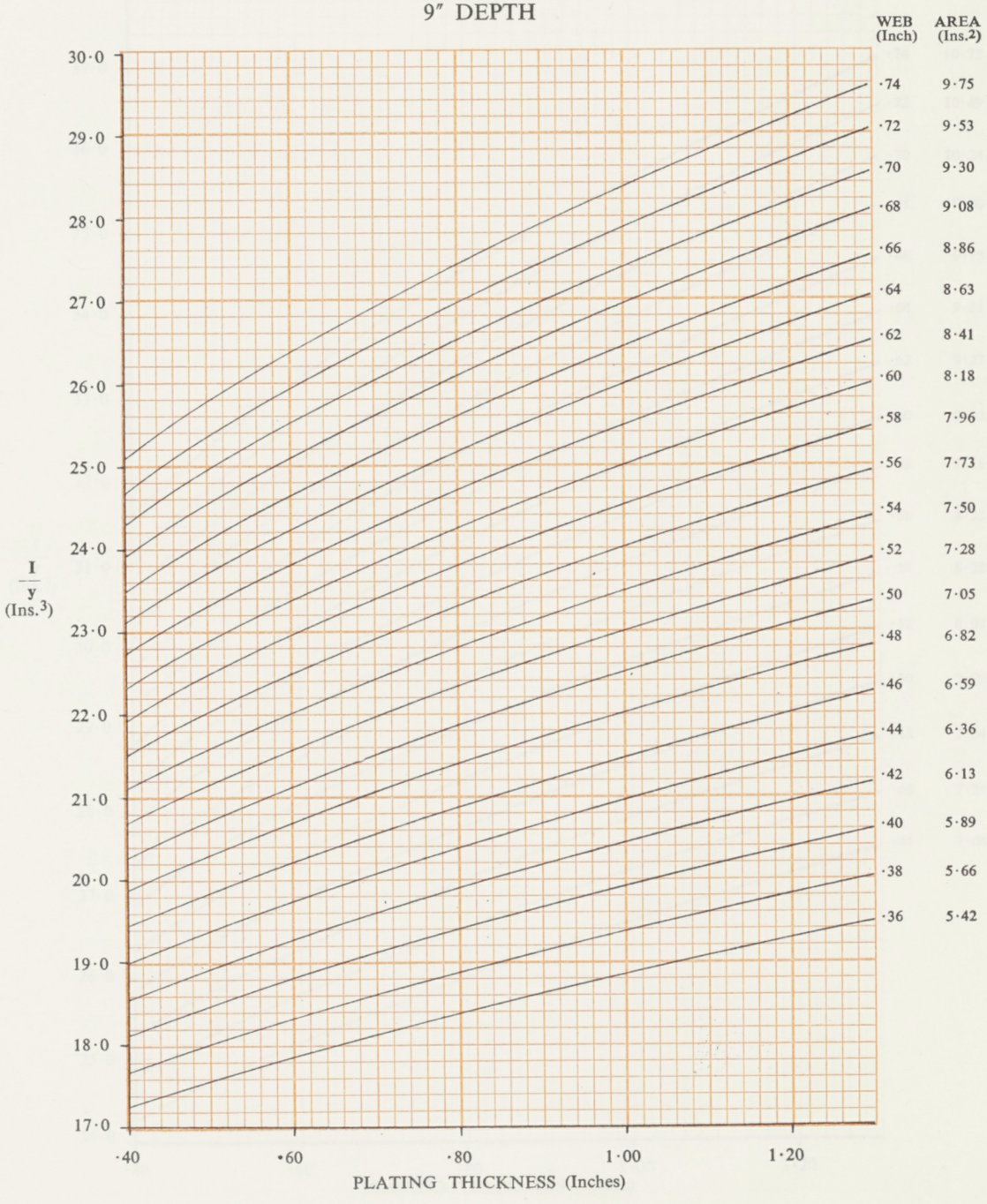
SECTION MODULUS AND AREA OF BULB ANGLES

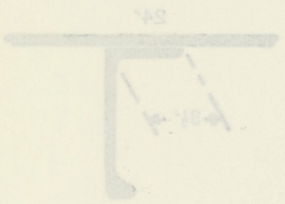
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

9″ DEPTH

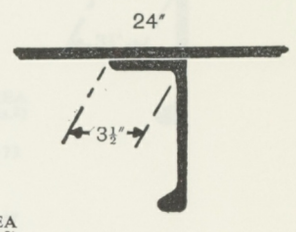



24"
3½" FLANGE

9" DEPTH
WEB (Inch)
AREA (Ins.²)
·74 9·75
·72 9·53
·70 9·30
·68 9·08
·66 8·86
·64 8·63
·62 8·41
·60 8·18
·58 7·96
·56 7·73
·54 7·50
·52 7·28
·50 7·05
·48 6·83
·46 6·60
·44 6·38
·42 6·15
·40 5·93
·38 5·66
·36 5·42
30·0
29·0
28·0
27·0
26·0
25·0
24·0
23·0
22·0
21·0
20·0
19·0
18·0
17·0
I/y (Ins.³)
·60
1·00
1·20
PLATING THICKNESS (Inches)

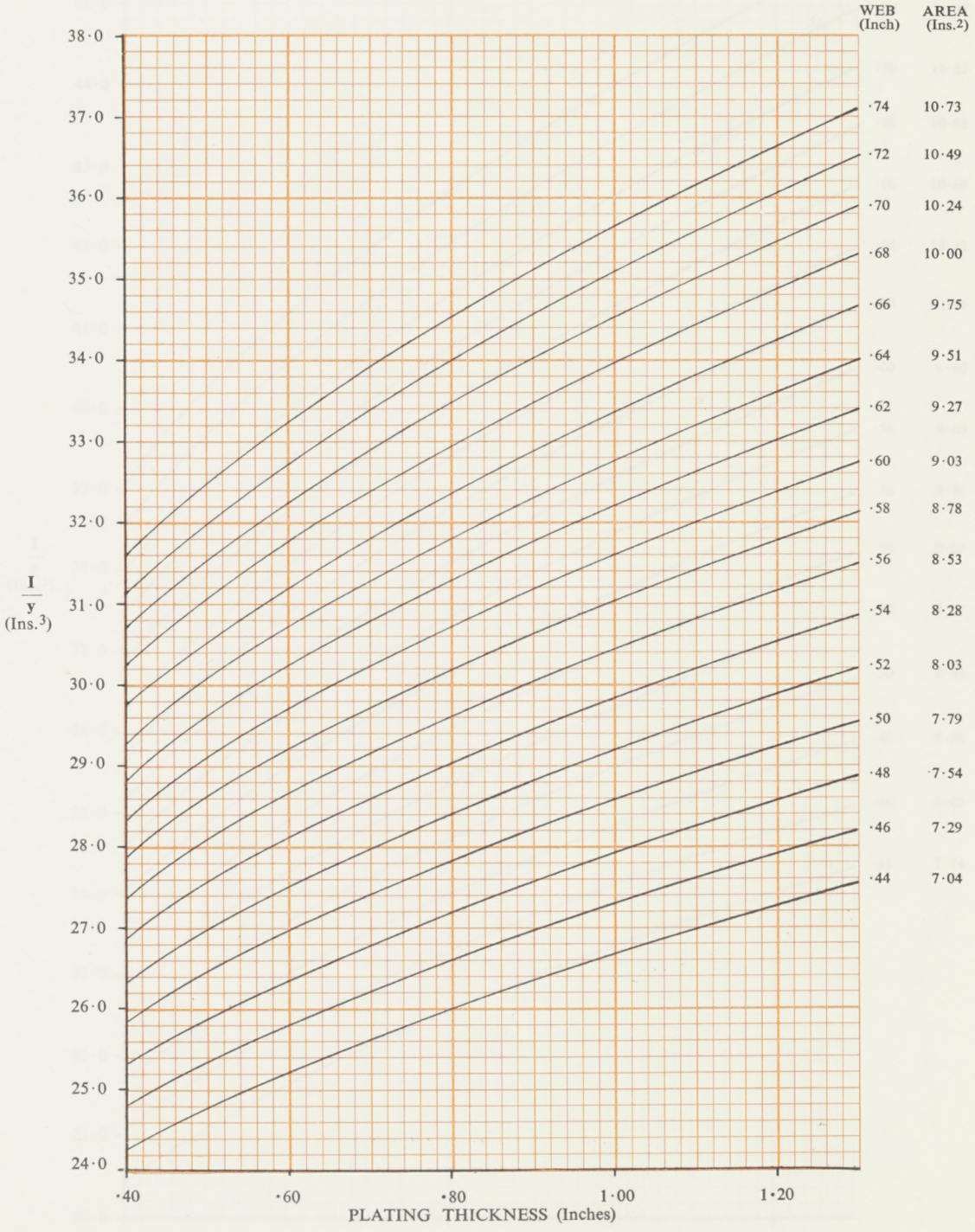
SECTION MODULUS AND AREA OF BULB ANGLES

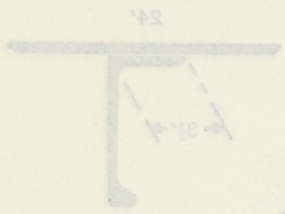
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

10″ DEPTH



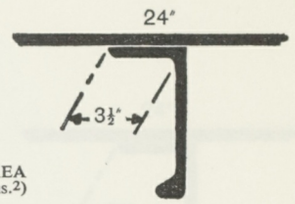

24"
3½"

WEB (inch)
AREA (ins.²)
·74 10·73
·72 10·49
·70 10·24
·68 10·00
·66 9·75
·64 9·51
·62 9·27
·60 9·03
·58 8·78
·56 8·53
·54 8·28
·52 8·03
·50 7·79
·48 7·54
·46 7·29
·44 7·04
38·0
37·0
36·0
35·0
34·0
33·0
32·0
31·0
30·0
29·0
28·0
27·0
26·0
25·0
24·0
$\frac{I}{y}$ (ins.³)
·40
·60
·80
1·00
1·20
PLATING THICKNESS (inches)

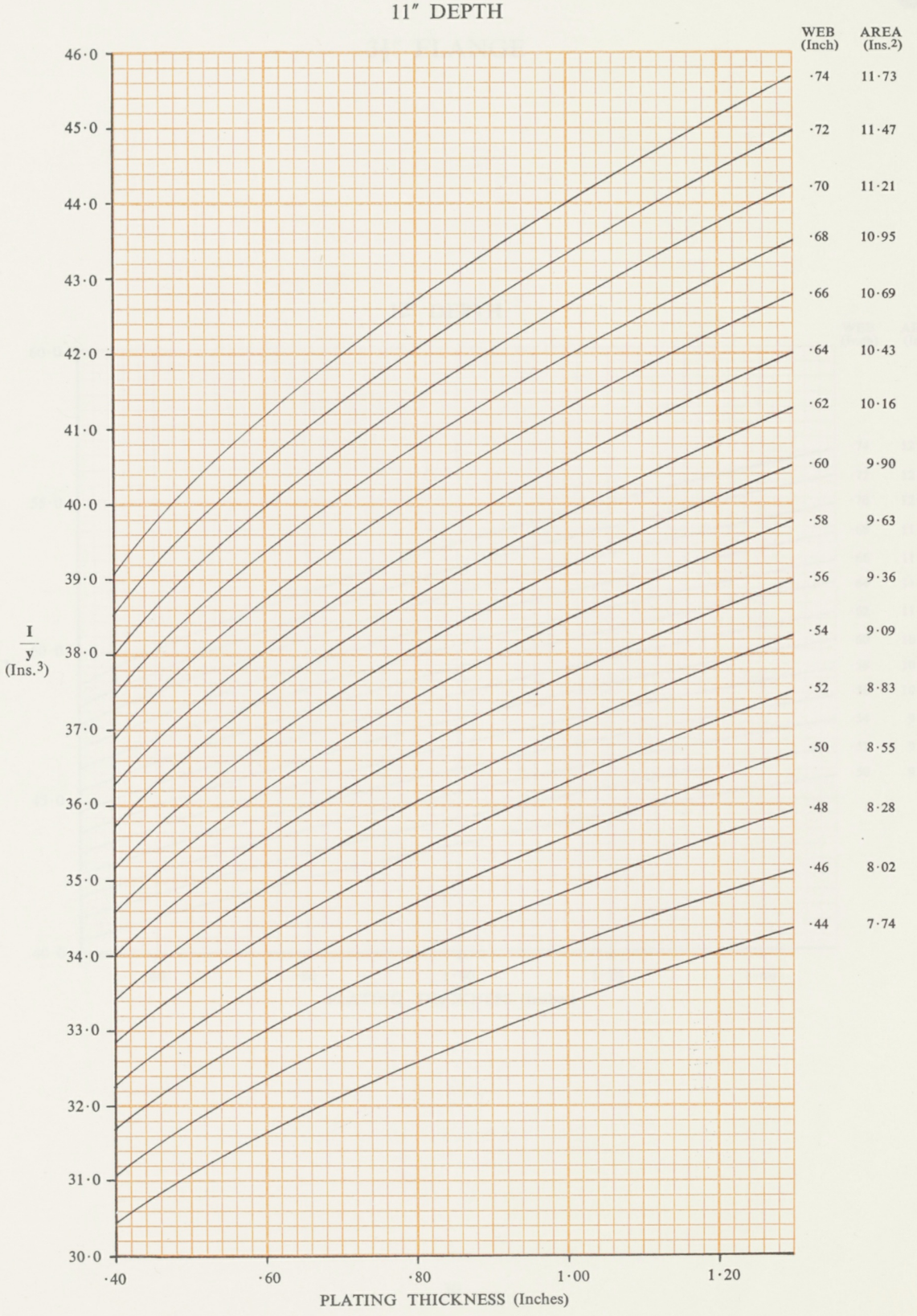
SECTION MODULUS AND AREA OF BULB ANGLES

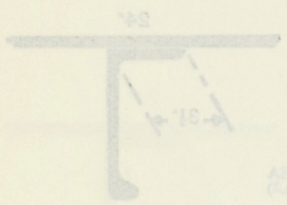
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

$3\frac{1}{2}''$ FLANGE



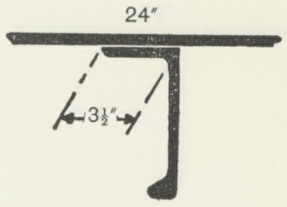
11″ DEPTH




24"
θ=31.4°

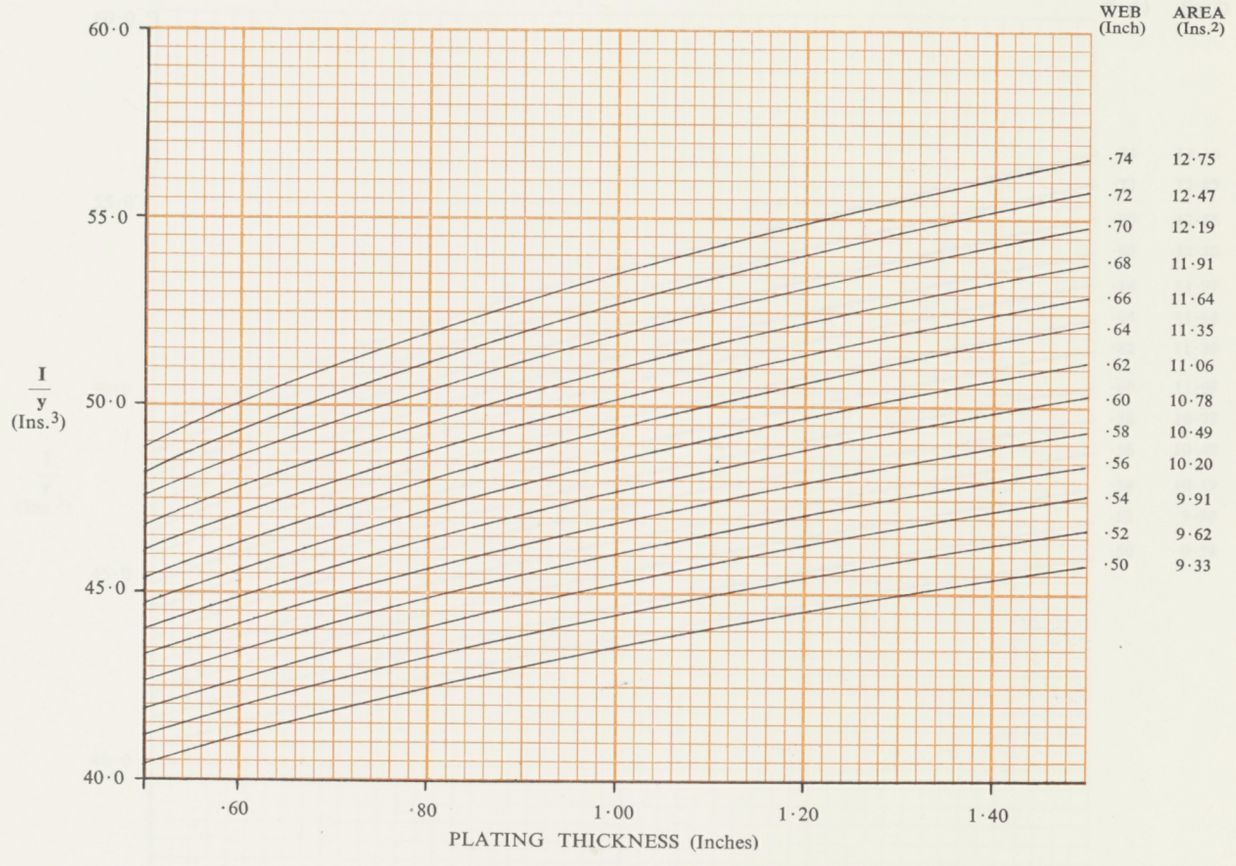
SECTION MODULUS AND AREA OF BULB ANGLES

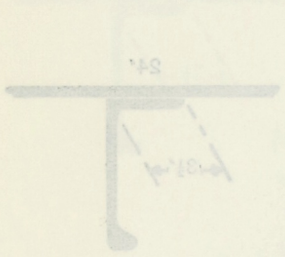
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

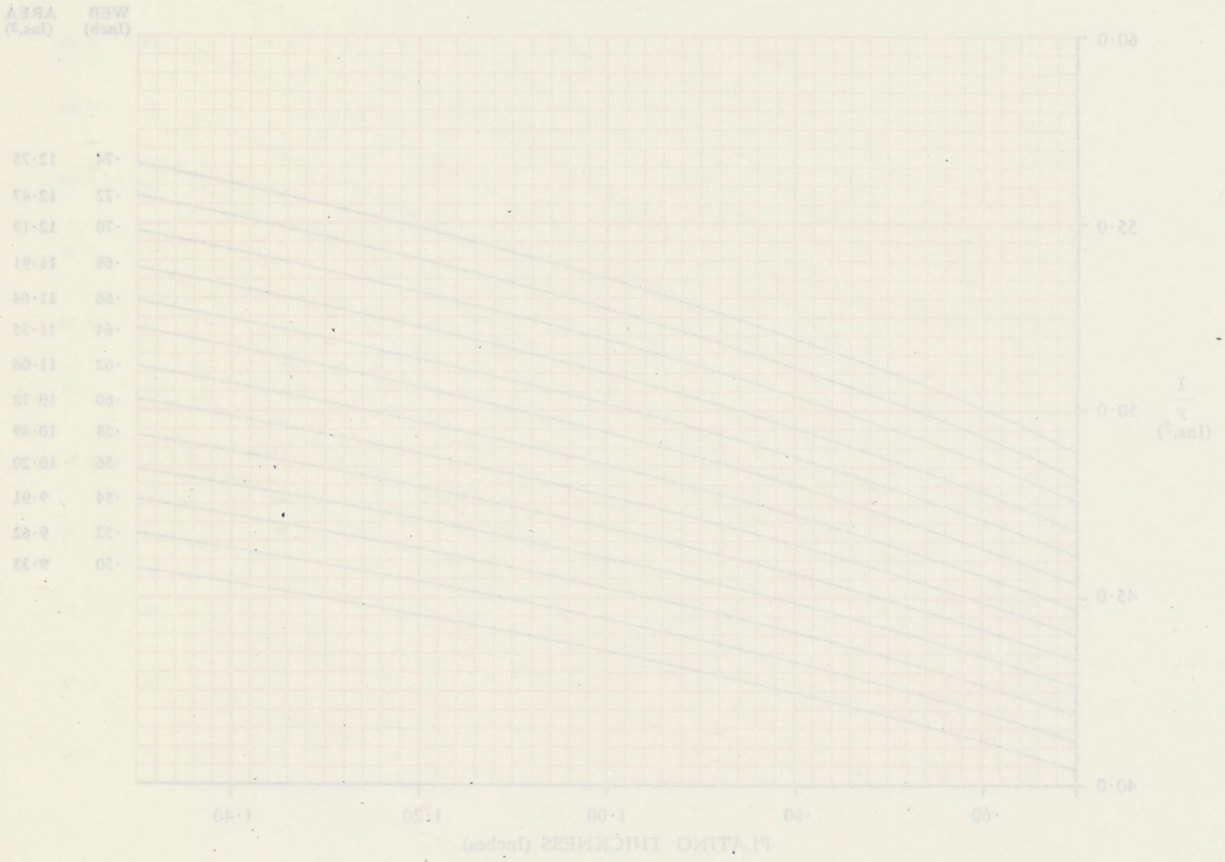


3½″ FLANGE

12″ DEPTH

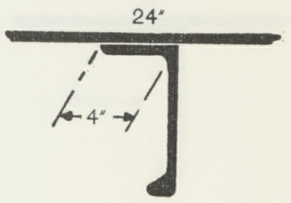




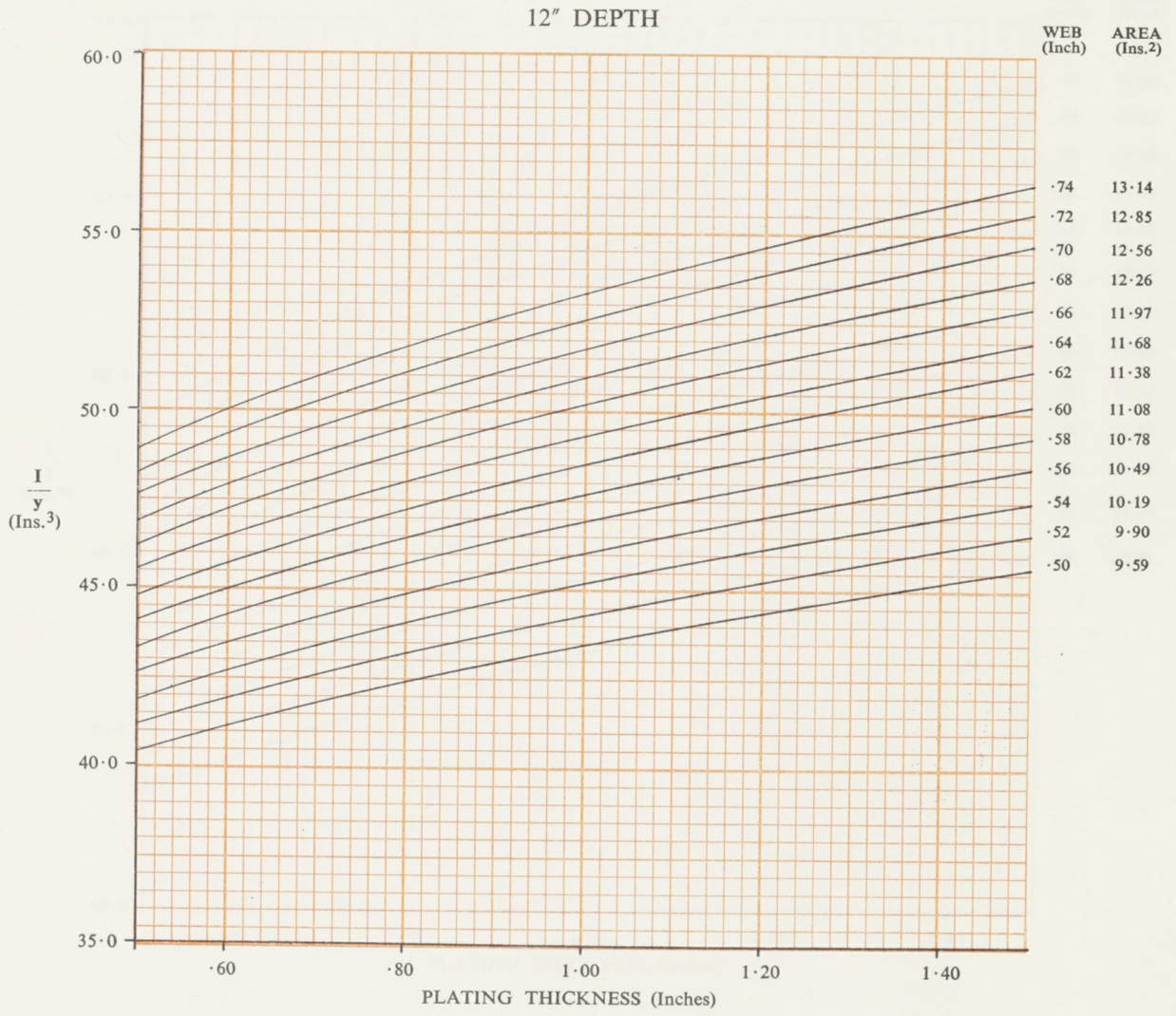


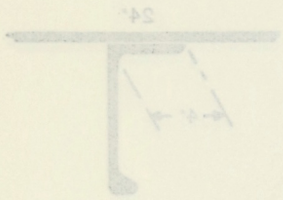
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



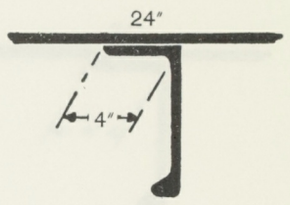
4″ FLANGE




24"
4"

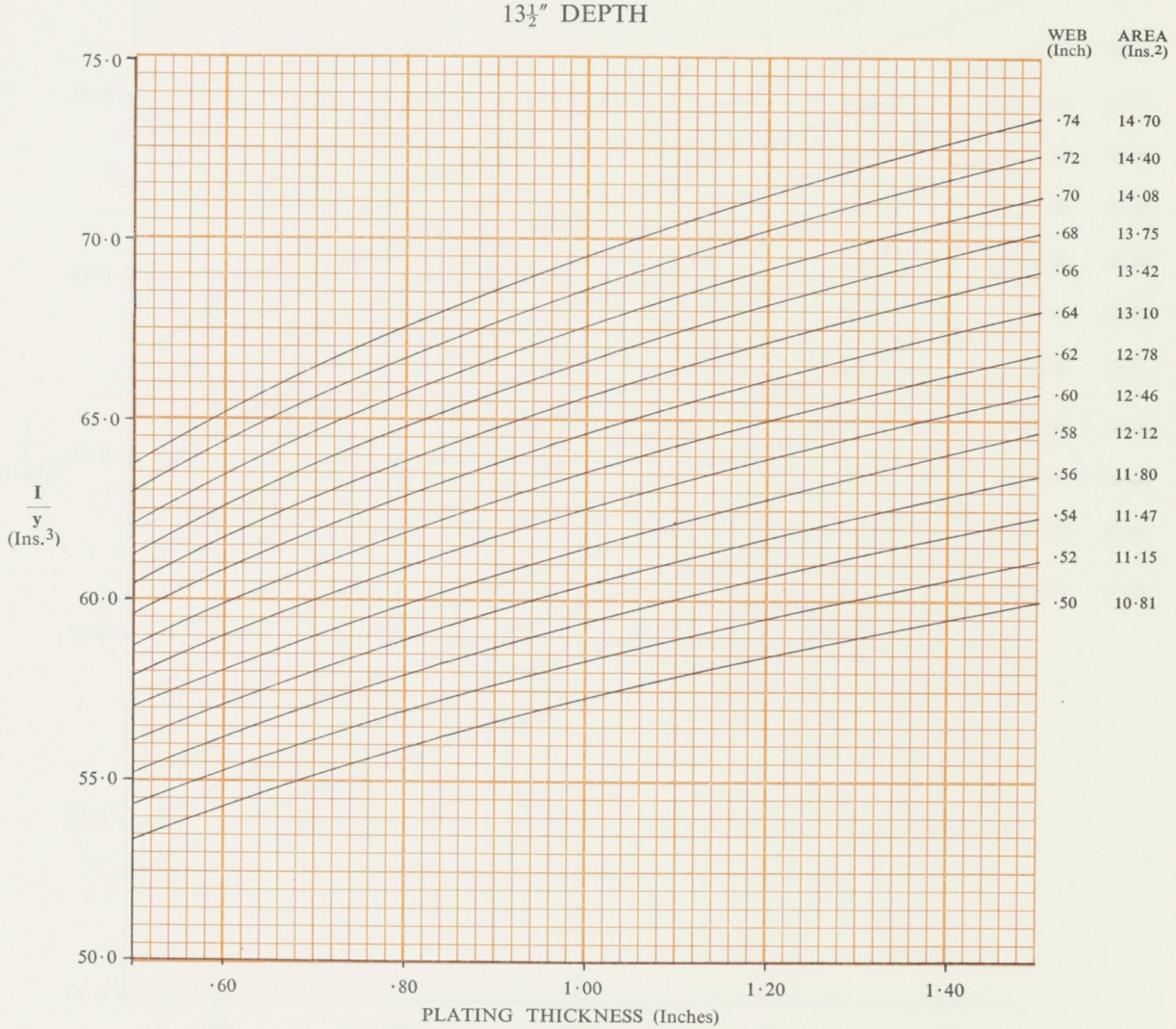
SECTION MODULUS AND AREA OF BULB ANGLES

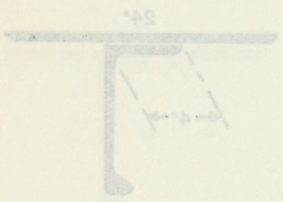
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

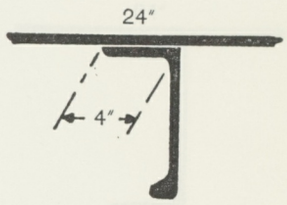
13½″ DEPTH




24"
4"

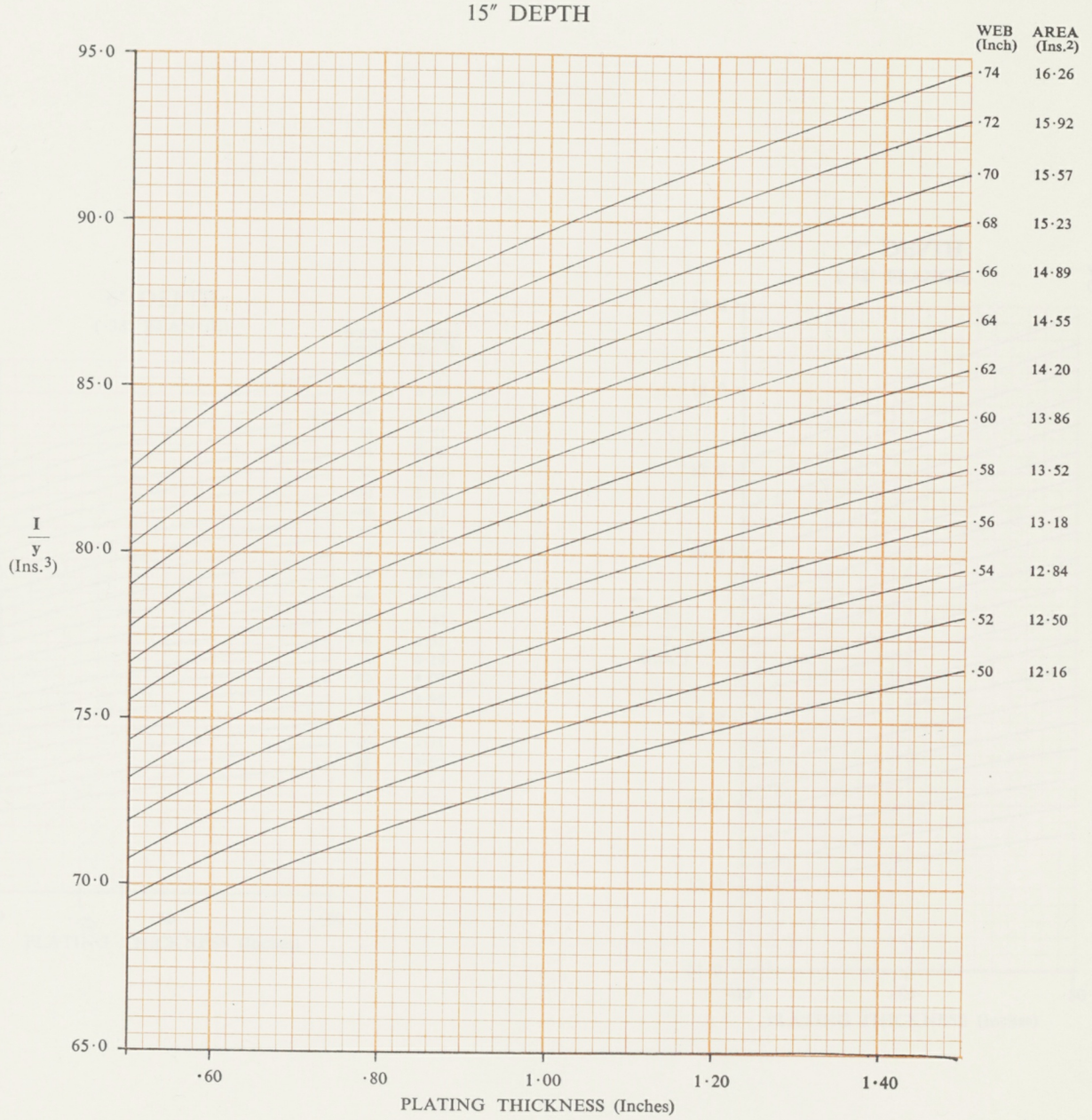
SECTION MODULUS AND AREA OF BULB ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

15″ DEPTH

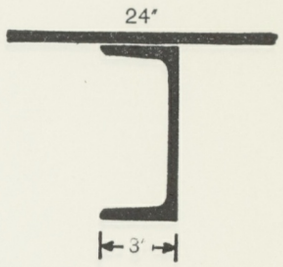


24"
4"

SECTION MODULUS AND AREA OF CHANNELS

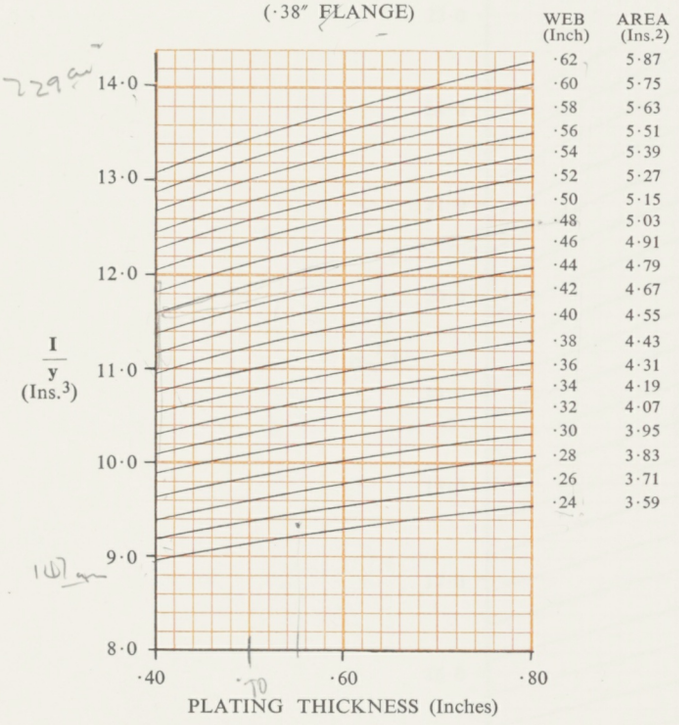
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

3″ FLANGE



6″ DEPTH

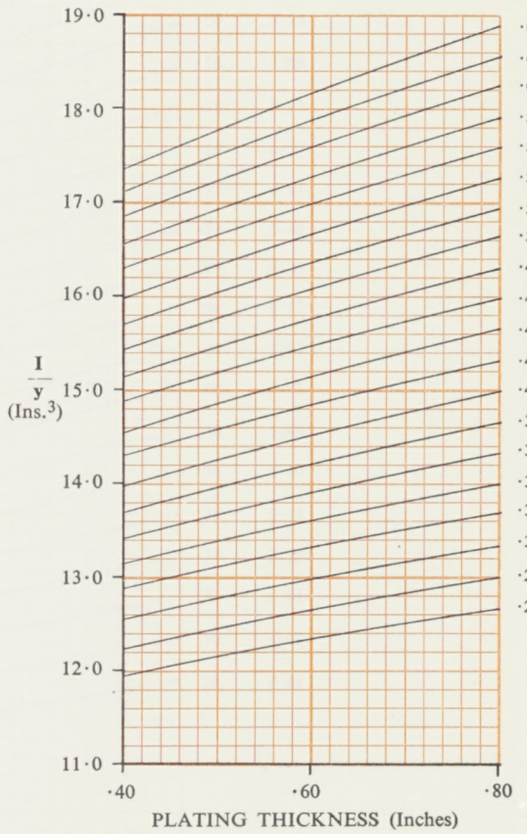
(·38″ FLANGE)



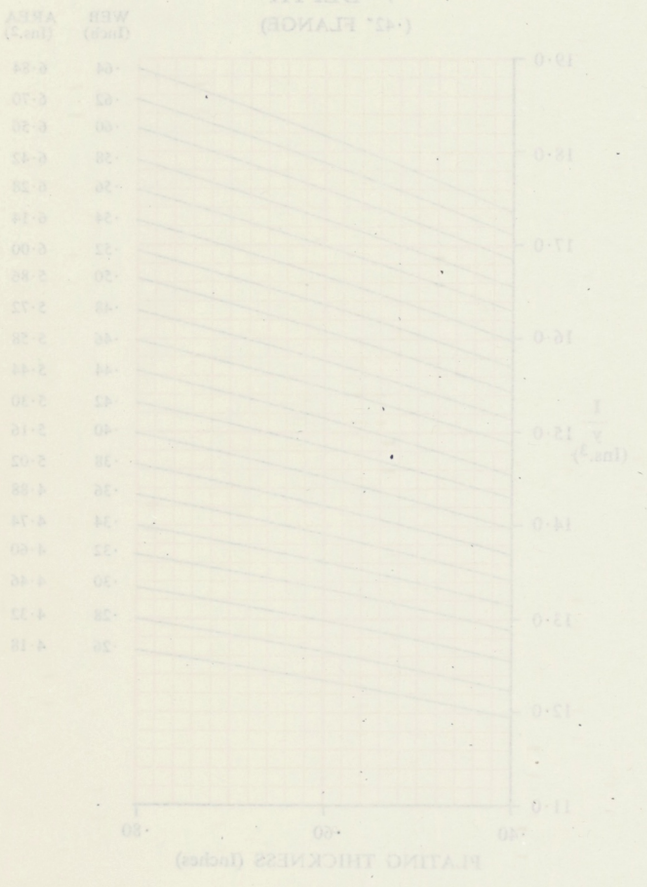
WEB (Inch)	AREA (Ins.2)
·62	5·87
·60	5·75
·58	5·63
·56	5·51
·54	5·39
·52	5·27
·50	5·15
·48	5·03
·46	4·91
·44	4·79
·42	4·67
·40	4·55
·38	4·43
·36	4·31
·34	4·19
·32	4·07
·30	3·95
·28	3·83
·26	3·71
·24	3·59

7″ DEPTH

(·42″ FLANGE)

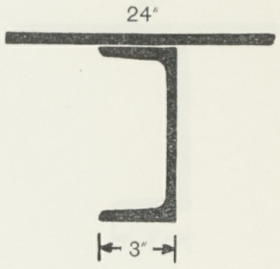


WEB (Inch)	AREA (Ins.2)
·64	6·84
·62	6·70
·60	6·56
·58	6·42
·56	6·28
·54	6·14
·52	6·00
·50	5·86
·48	5·72
·46	5·58
·44	5·44
·42	5·30
·40	5·16
·38	5·02
·36	4·88
·34	4·74
·32	4·60
·30	4·46
·28	4·32
·26	4·18



SECTION MODULUS AND AREA OF CHANNELS

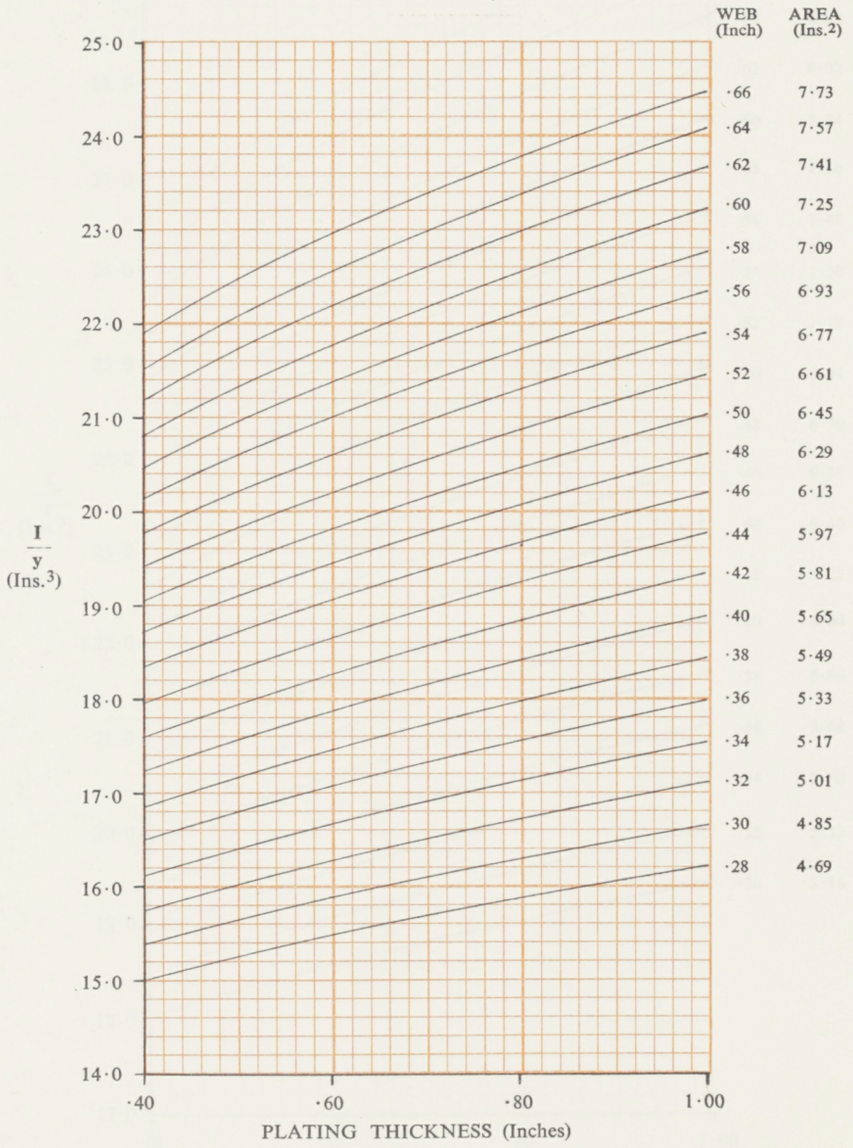
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3″ FLANGE

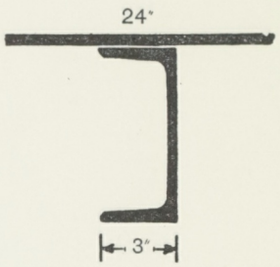
8″ DEPTH

(·44″ FLANGE)



SECTION MODULUS AND AREA OF CHANNELS

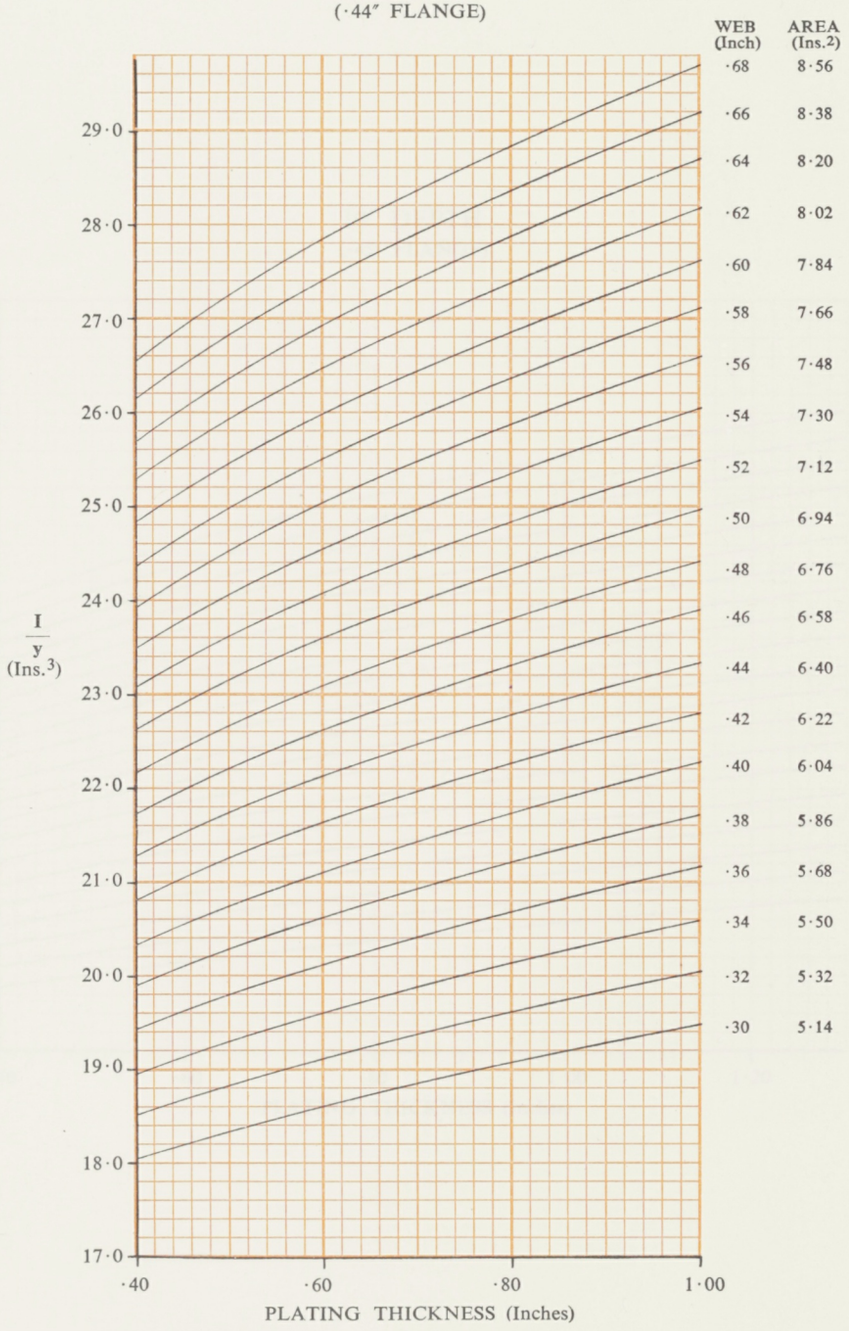
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3″ FLANGE

9″ DEPTH

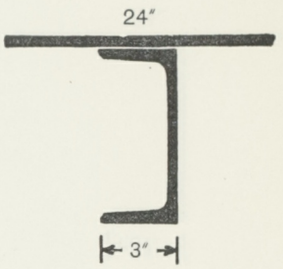
(·44″ FLANGE)



24"
3"

SECTION MODULUS AND AREA OF CHANNELS

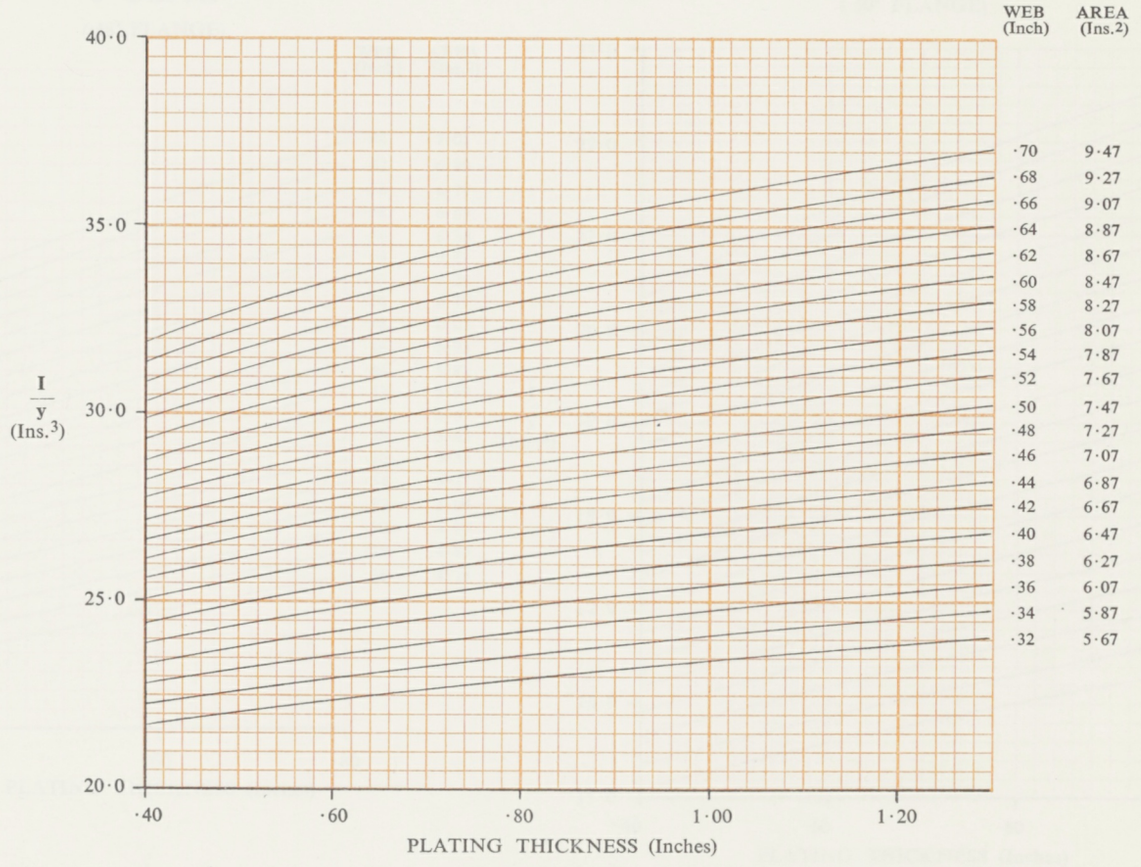
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3″ FLANGE

10″ DEPTH

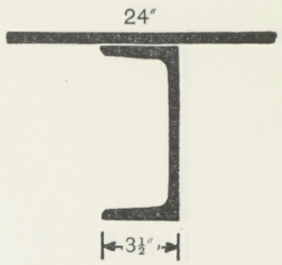
(·45″ FLANGE)



WEB (Inch)	AREA (Ins.2)
·70	9·47
·68	9·27
·66	9·07
·64	8·87
·62	8·67
·60	8·47
·58	8·27
·56	8·07
·54	7·87
·52	7·67
·50	7·47
·48	7·27
·46	7·07
·44	6·87
·42	6·67
·40	6·47
·38	6·27
·36	6·07
·34	5·87
·32	5·67

SECTION MODULUS AND AREA OF CHANNELS

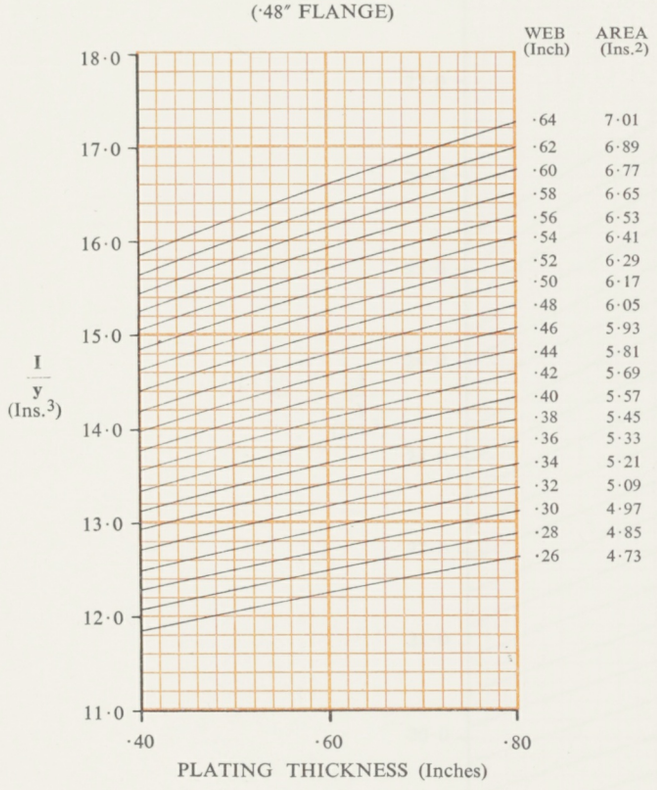
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

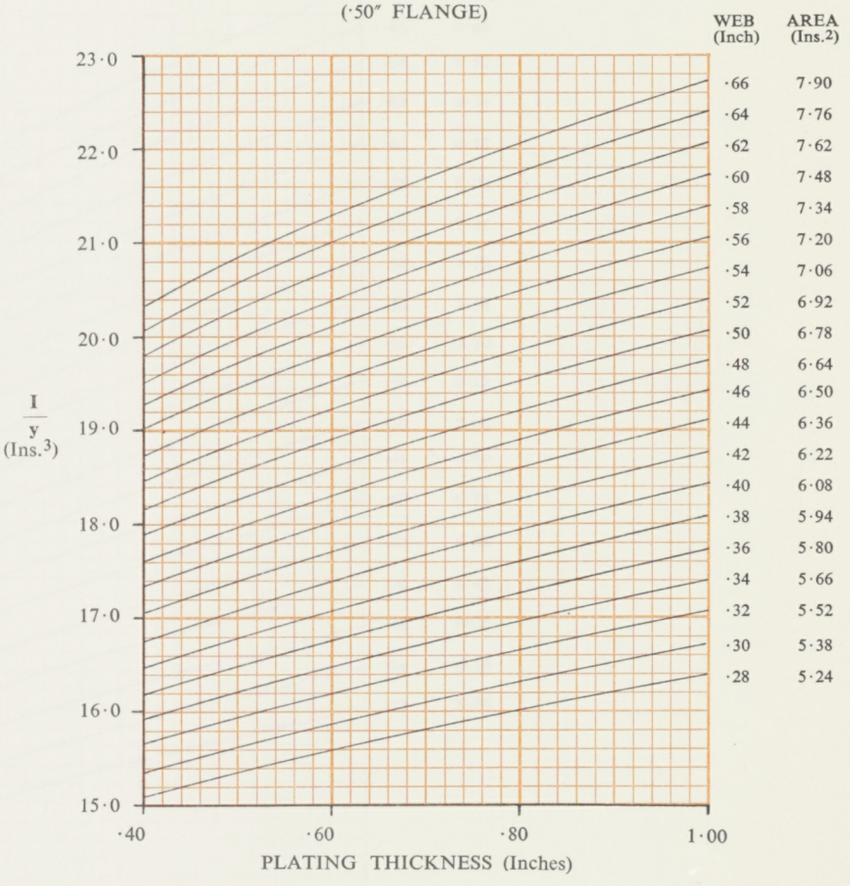
6″ DEPTH

(·48″ FLANGE)



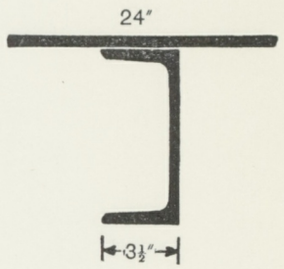
7″ DEPTH

(·50″ FLANGE)



SECTION MODULUS AND AREA OF CHANNELS

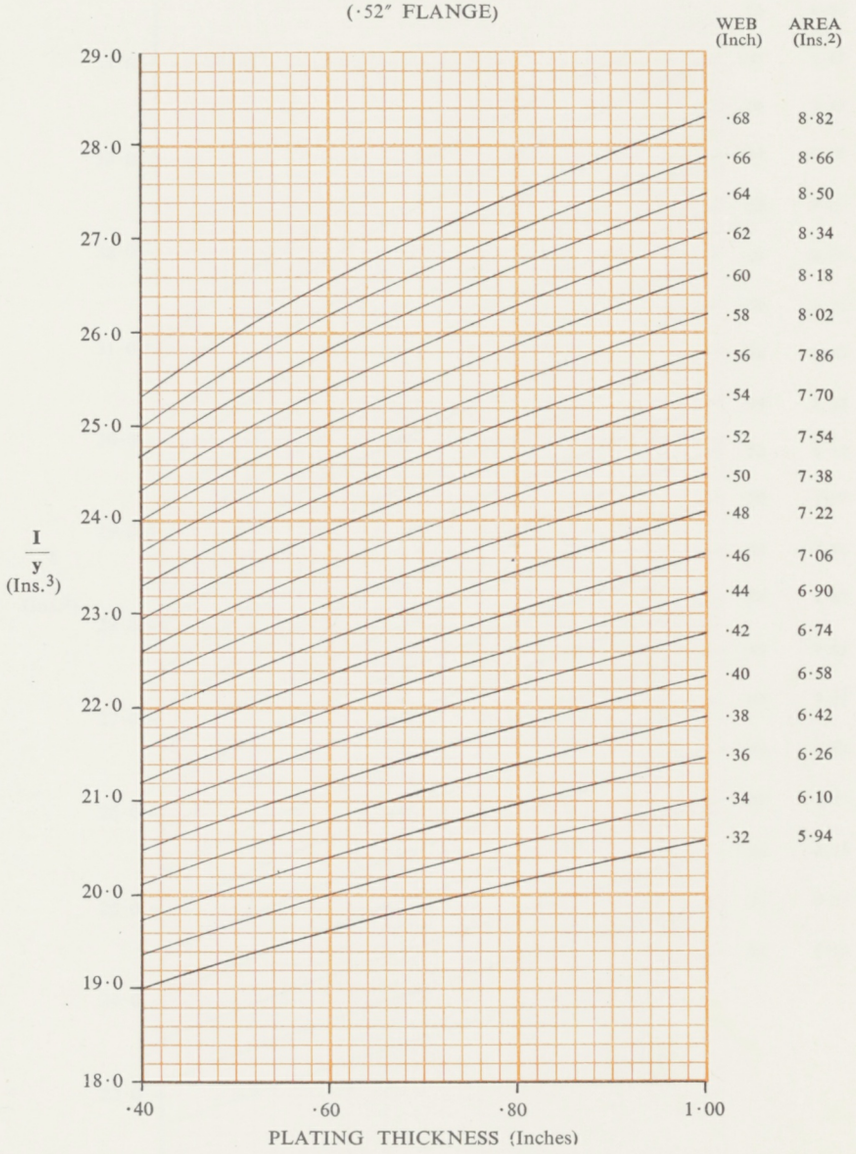
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

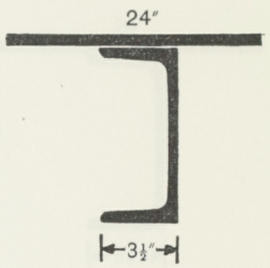
8″ DEPTH

(·52″ FLANGE)



SECTION MODULUS AND AREA OF CHANNELS

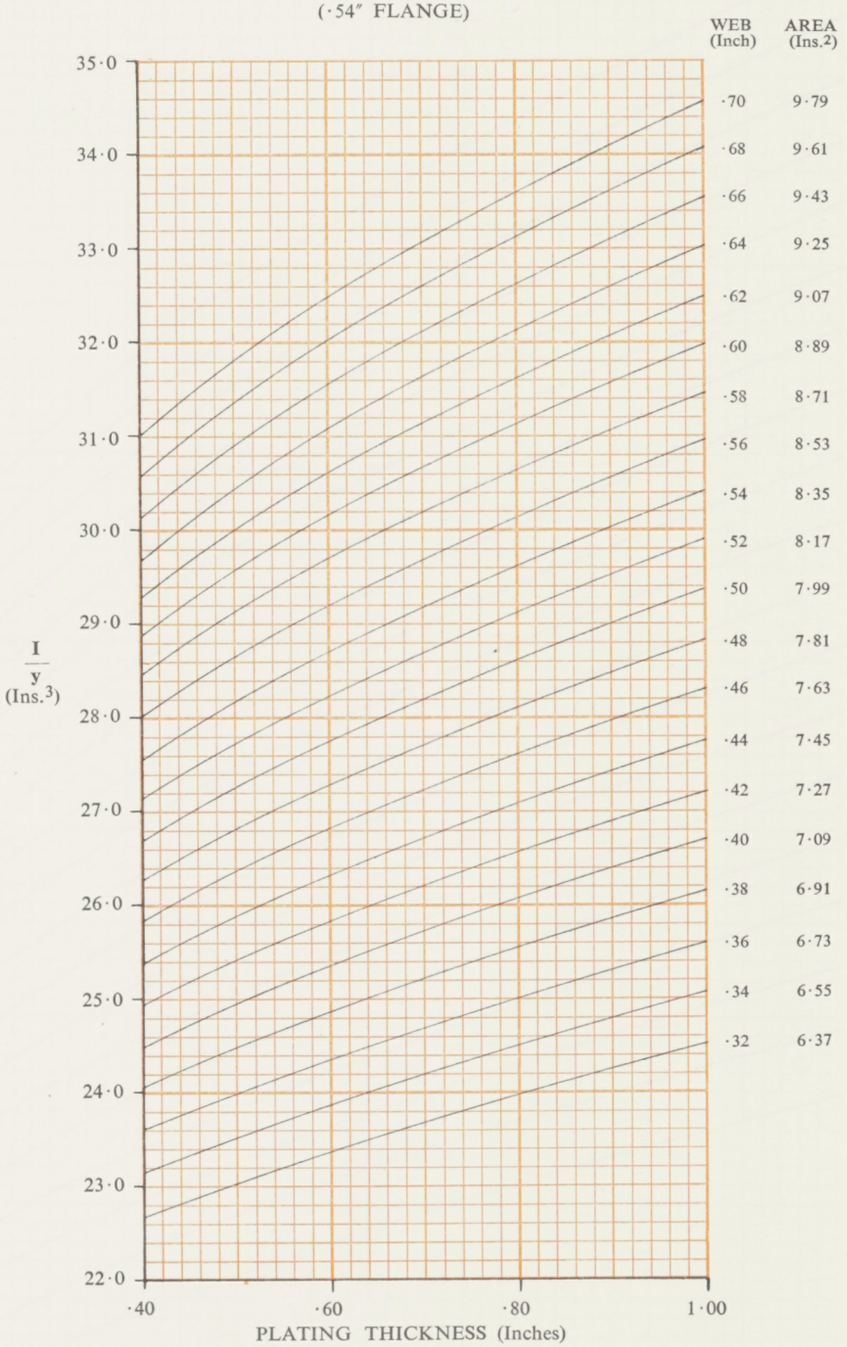
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

9″ DEPTH

(·54″ FLANGE)

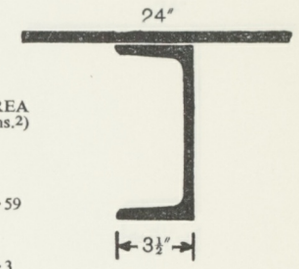


2½"
3½"

SECTION MODULUS AND AREA OF CHANNELS

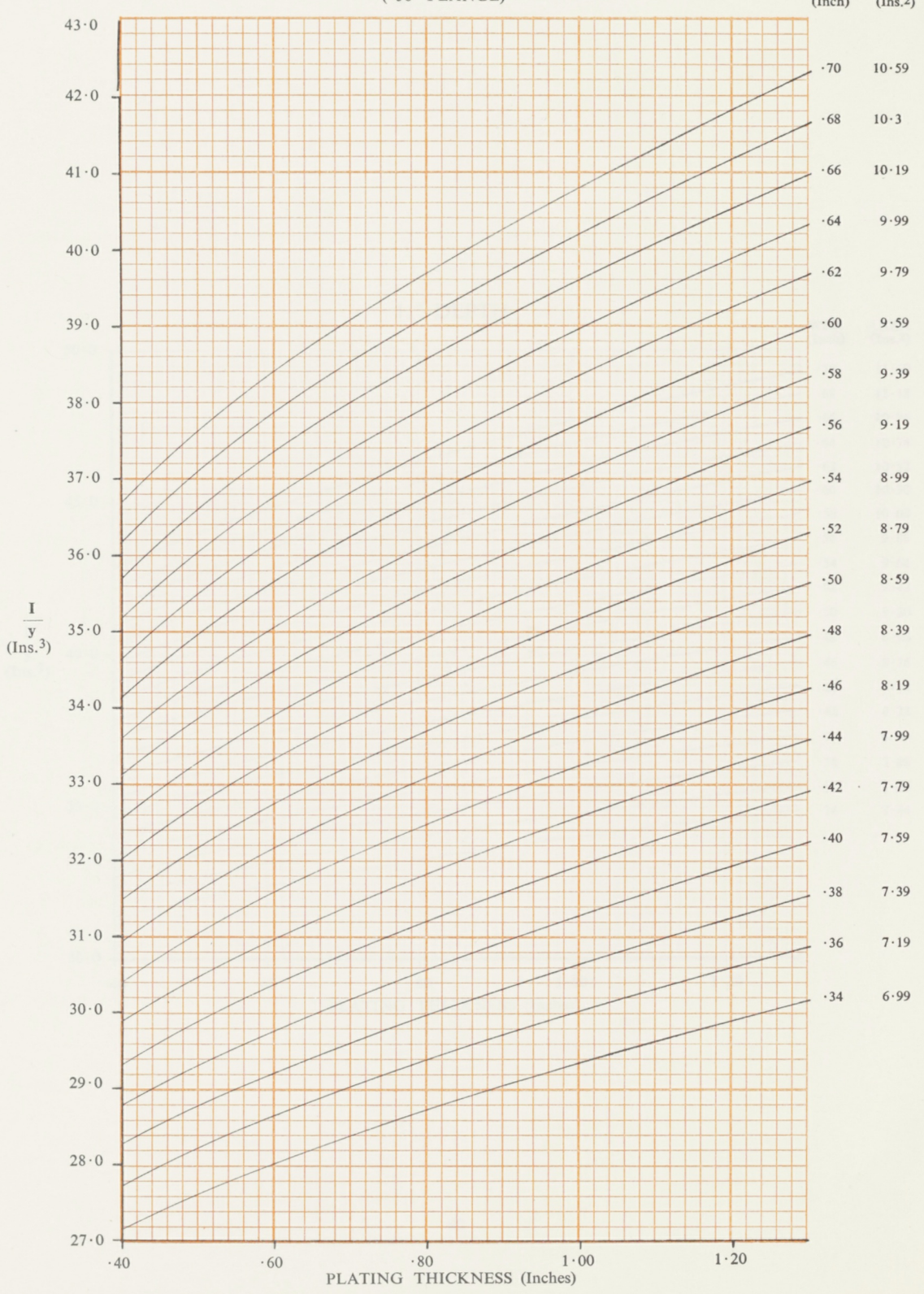
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

$3\frac{1}{2}''$ FLANGE



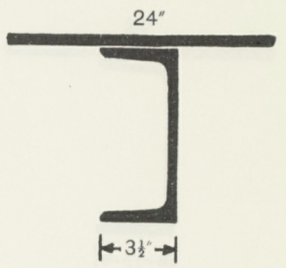
10″ DEPTH

(·56″ FLANGE)



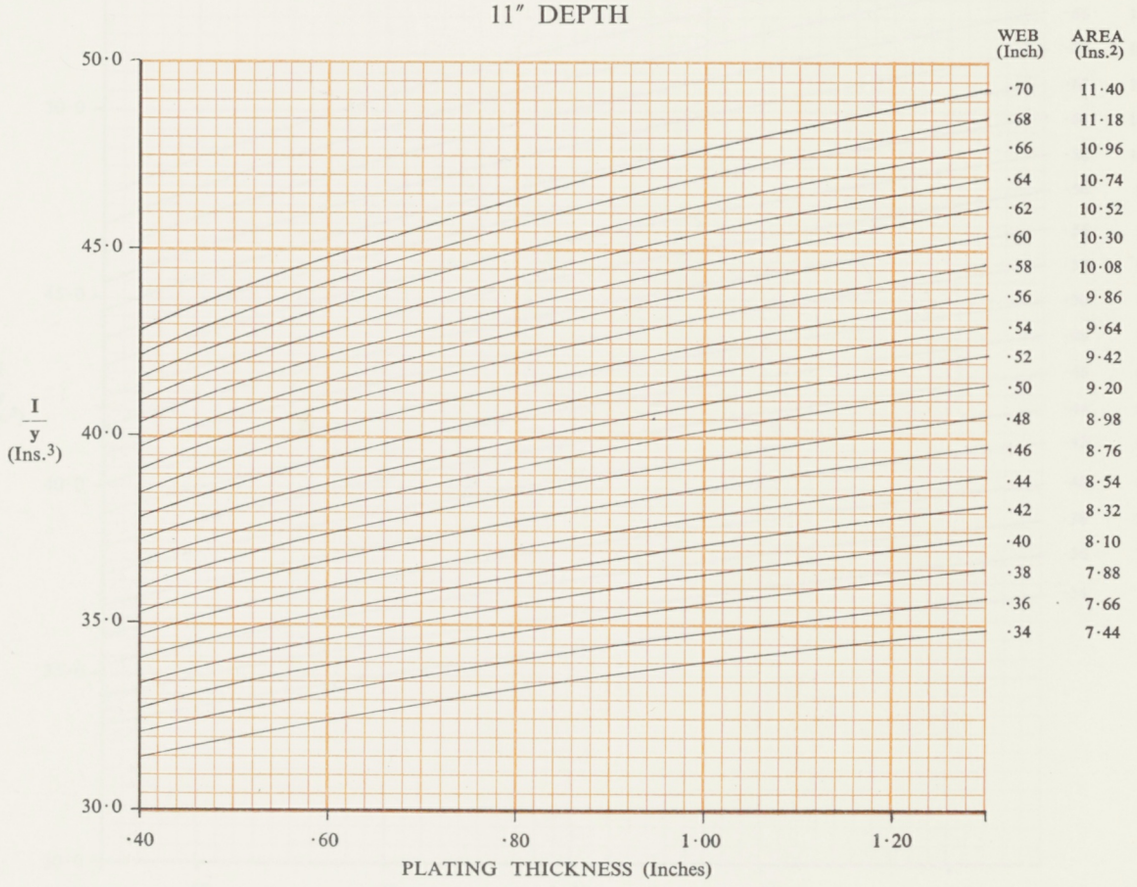
SECTION MODULUS AND AREA OF CHANNELS

SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

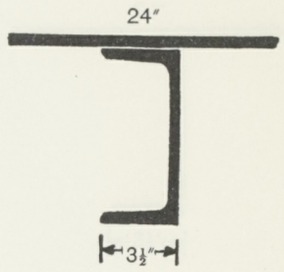
11″ DEPTH



3½"

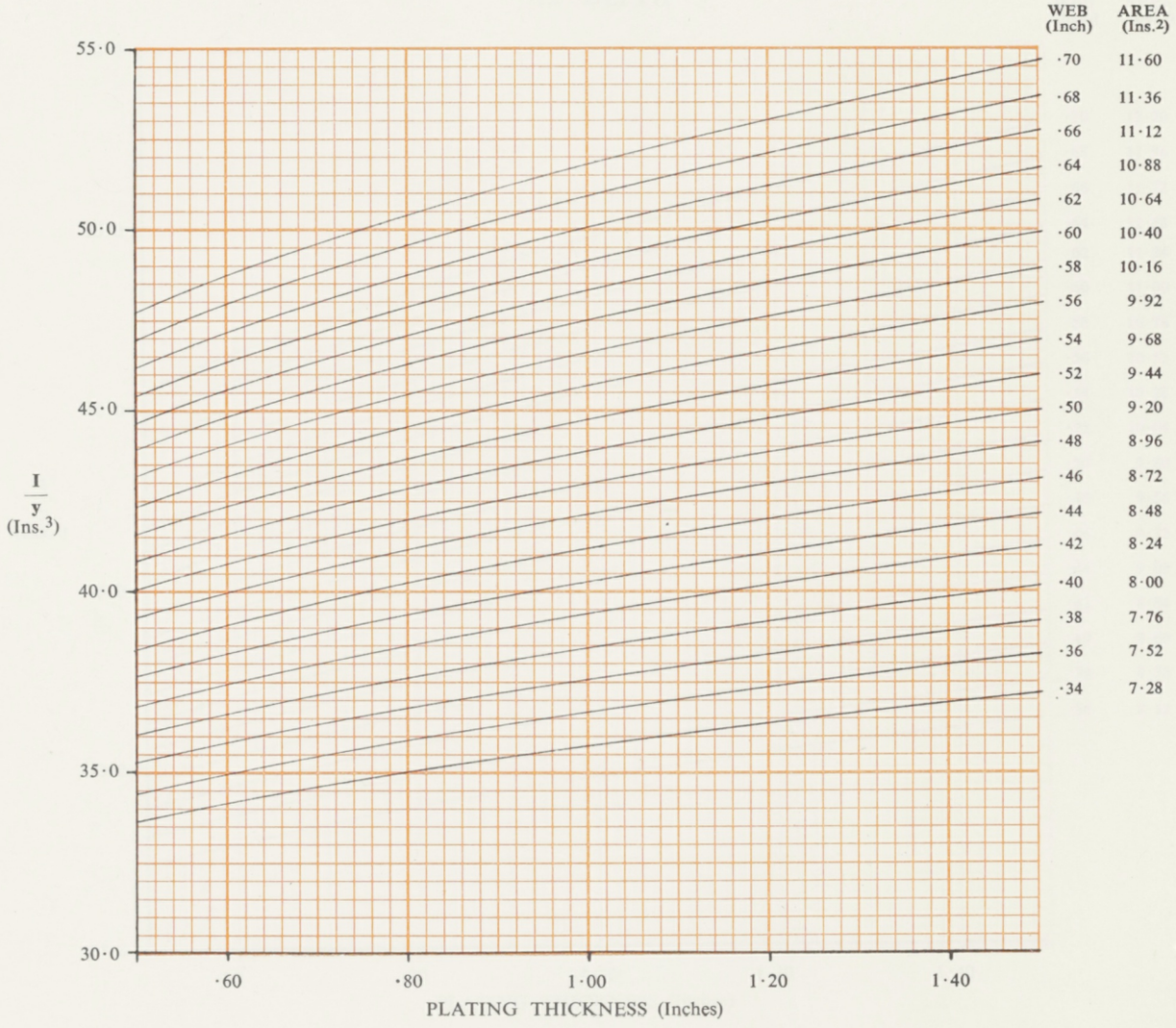
SECTION MODULUS AND AREA OF CHANNELS

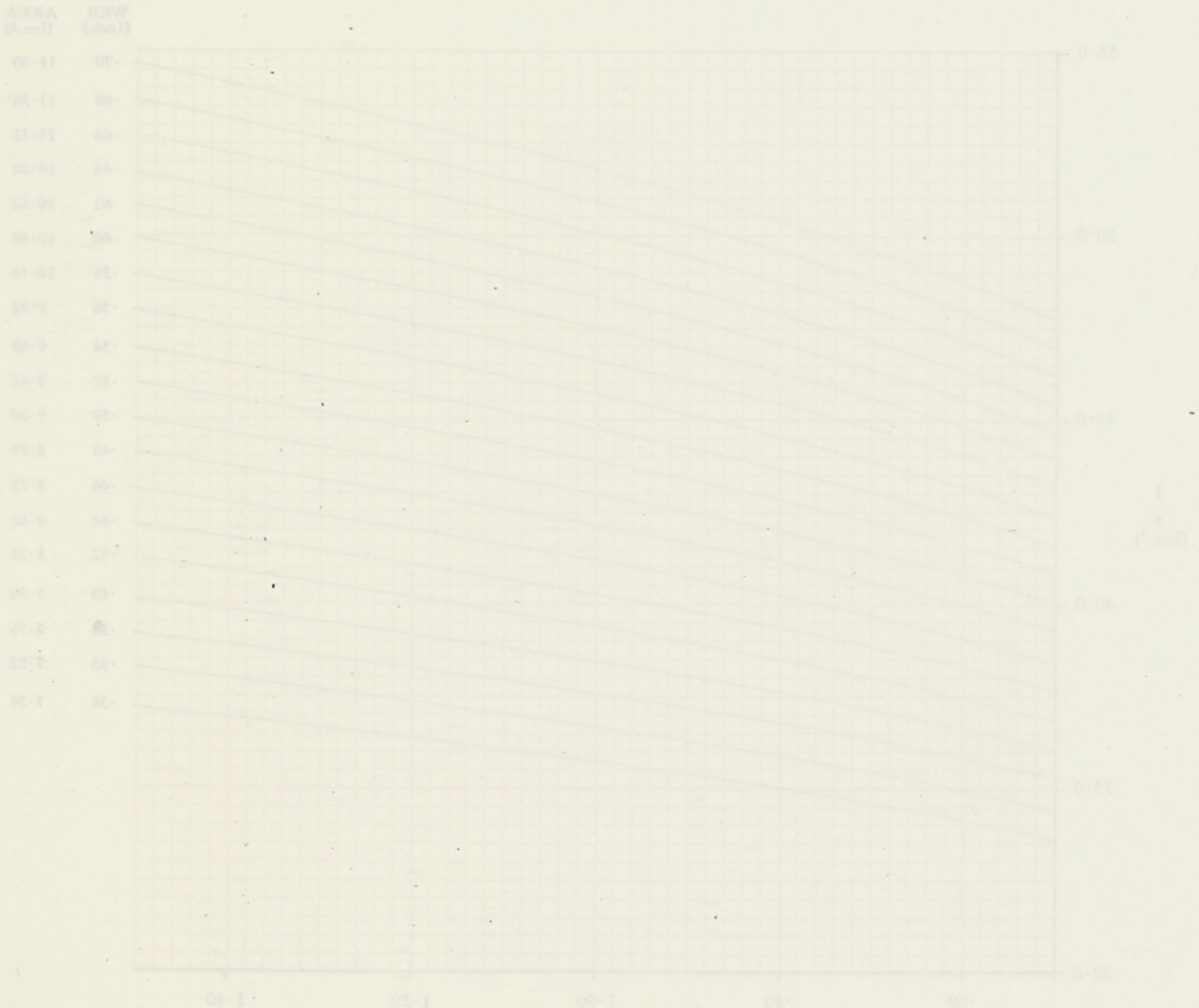
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ × ·50″ FLANGE

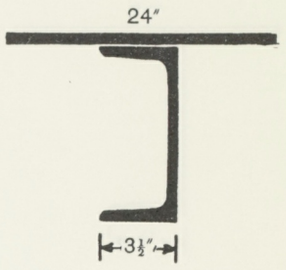
12″ DEPTH





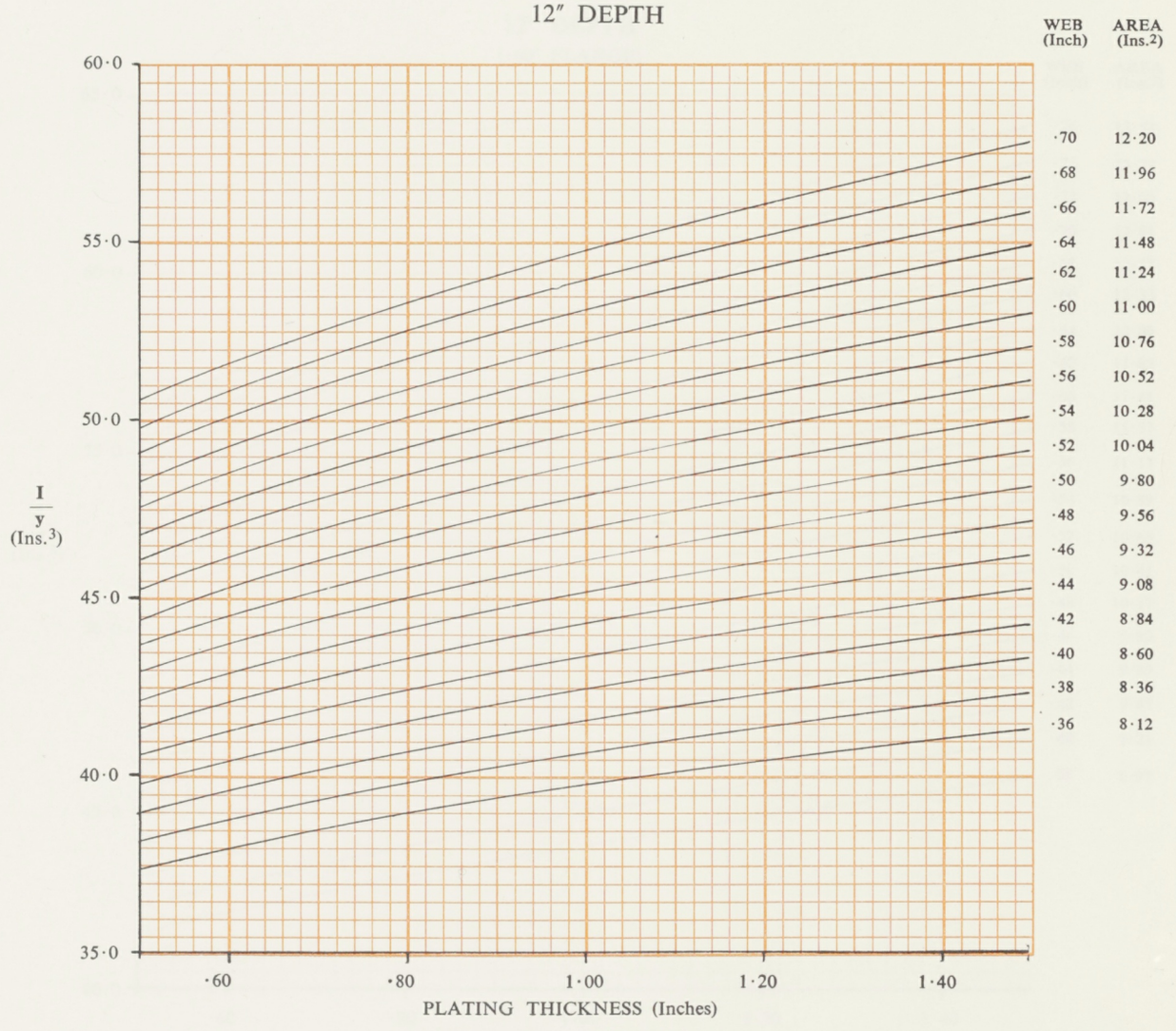
SECTION MODULUS AND AREA OF CHANNELS

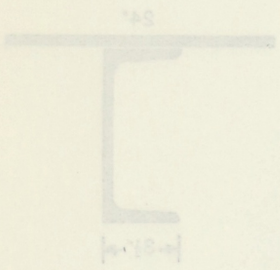
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ × ·60″ FLANGE

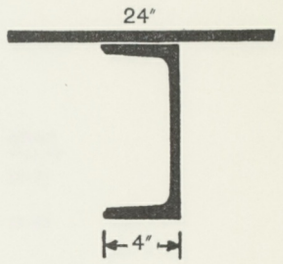
12″ DEPTH





SECTION MODULUS AND AREA OF CHANNELS

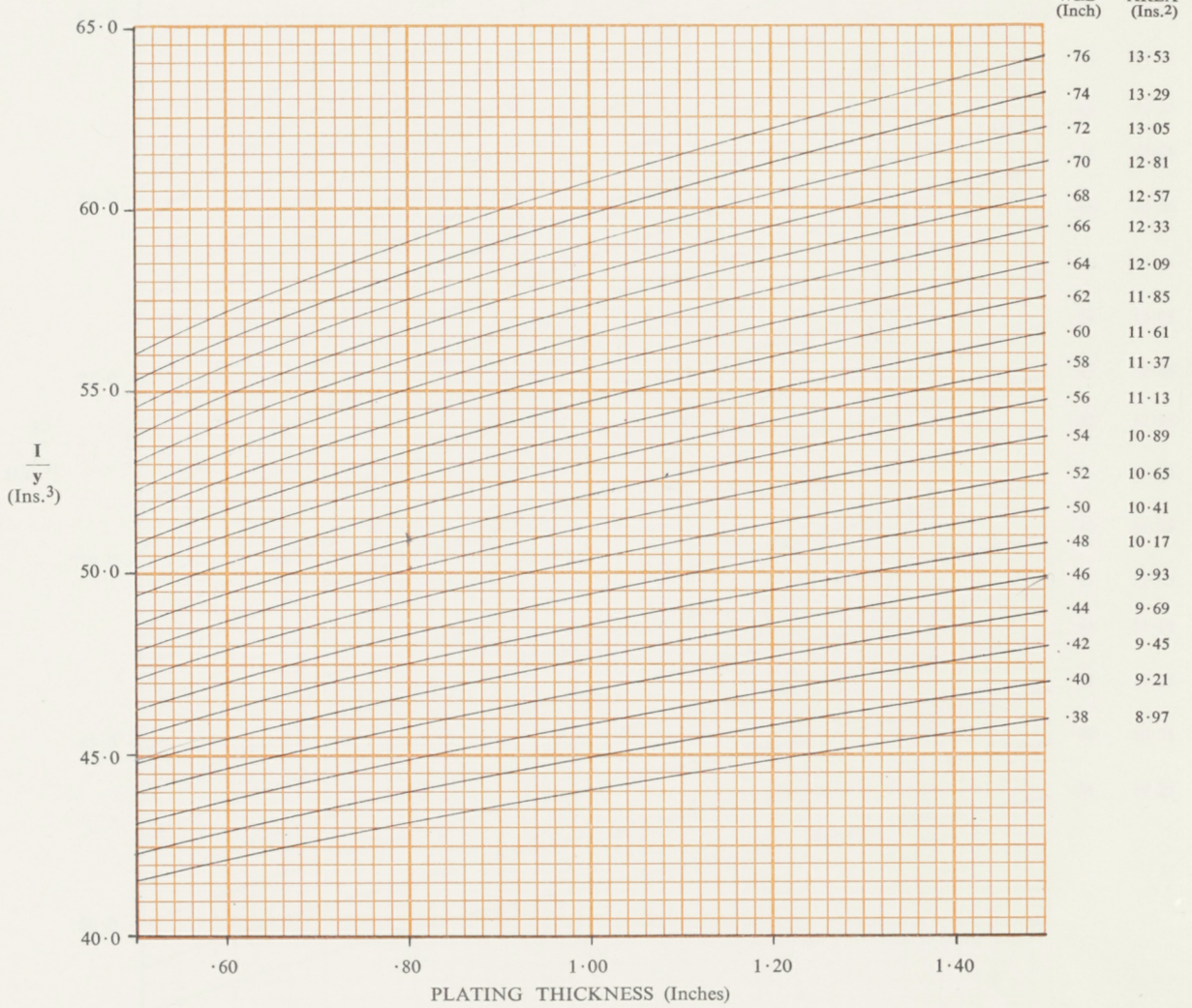
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

12″ DEPTH

(·60″ FLANGE)

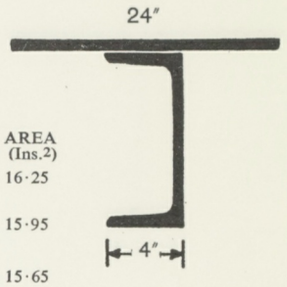


WEB (Inch)	AREA (Ins.2)
·76	13·53
·74	13·29
·72	13·05
·70	12·81
·68	12·57
·66	12·33
·64	12·09
·62	11·85
·60	11·61
·58	11·37
·56	11·13
·54	10·89
·52	10·65
·50	10·41
·48	10·17
·46	9·93
·44	9·69
·42	9·45
·40	9·21
·38	8·97

SECTION MODULUS AND AREA OF CHANNELS

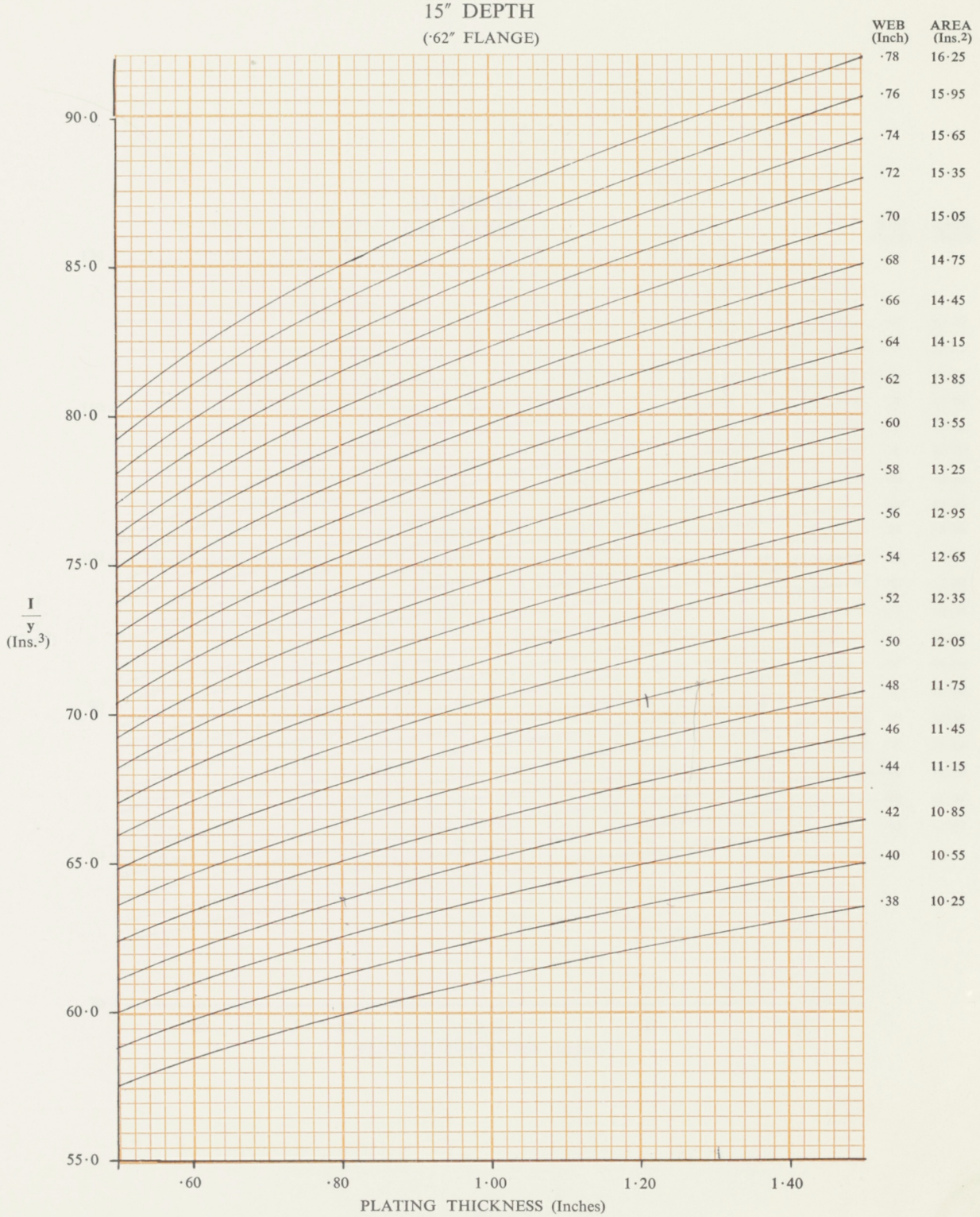
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

4″ FLANGE



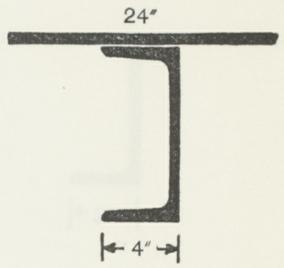
15″ DEPTH

(·62″ FLANGE)



SECTION MODULUS AND AREA OF CHANNELS

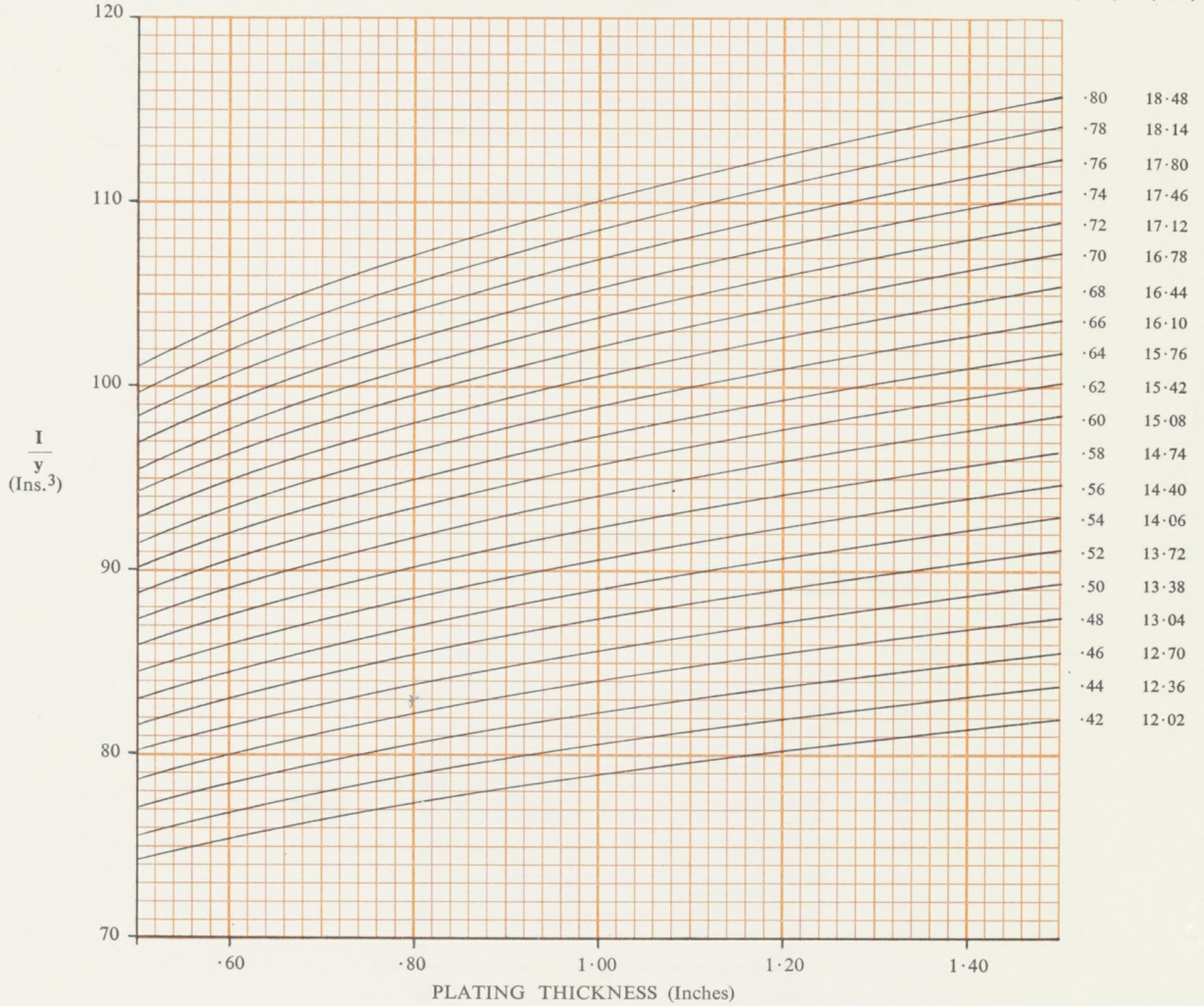
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

17″ DEPTH

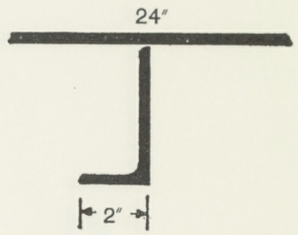
(·68″ FLANGE)



WEB (Inch)	AREA (Ins.2)
·80	18·48
·78	18·14
·76	17·80
·74	17·46
·72	17·12
·70	16·78
·68	16·44
·66	16·10
·64	15·76
·62	15·42
·60	15·08
·58	14·74
·56	14·40
·54	14·06
·52	13·72
·50	13·38
·48	13·04
·46	12·70
·44	12·36
·42	12·02

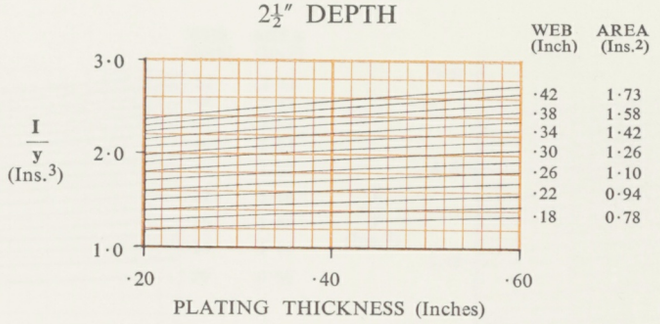
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



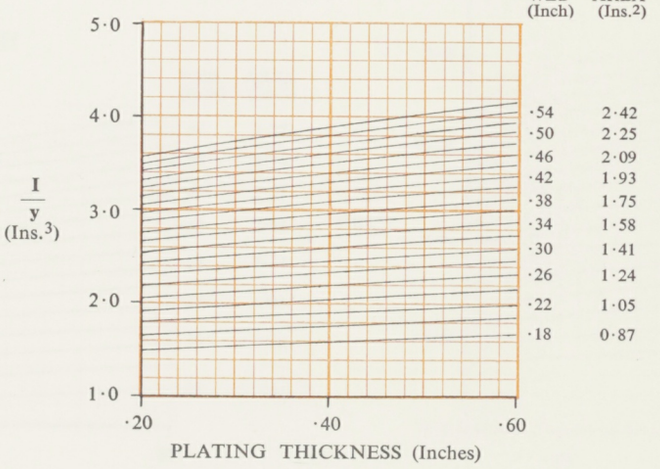
2″ FLANGE

2½″ DEPTH



WEB (Inch)	AREA (Ins.2)
·42	1·73
·38	1·58
·34	1·42
·30	1·26
·26	1·10
·22	0·94
·18	0·78

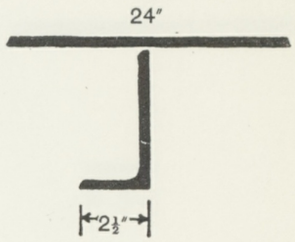
3″ DEPTH



WEB (Inch)	AREA (Ins.2)
·54	2·42
·50	2·25
·46	2·09
·42	1·93
·38	1·75
·34	1·58
·30	1·41
·26	1·24
·22	1·05
·18	0·87

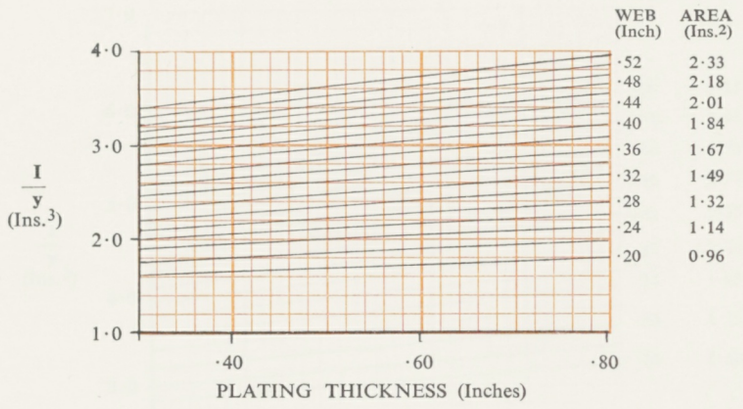
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

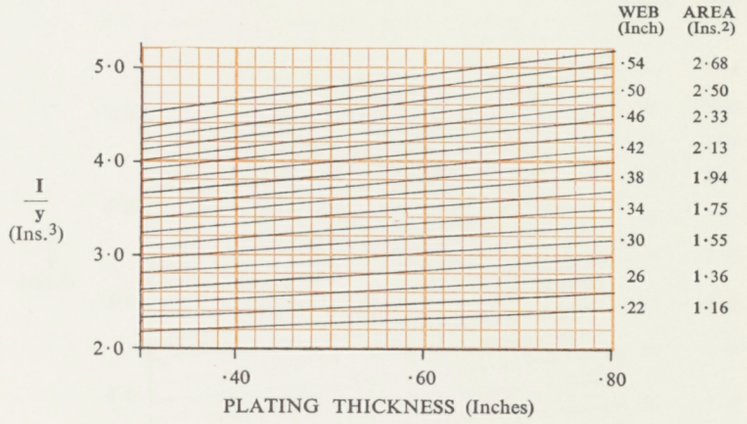


2½″ FLANGE

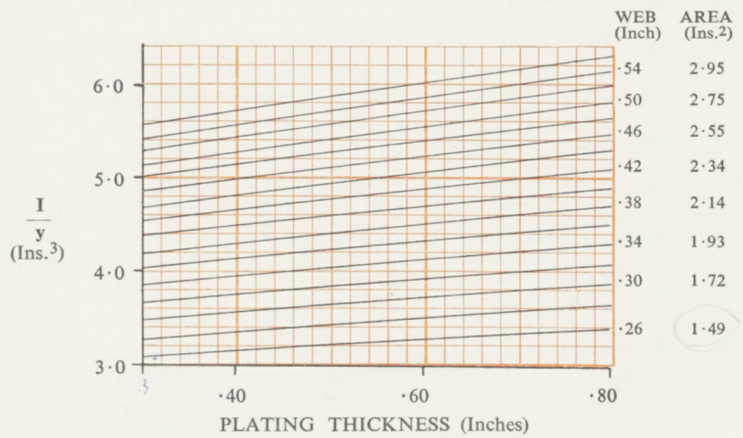
2½″ DEPTH



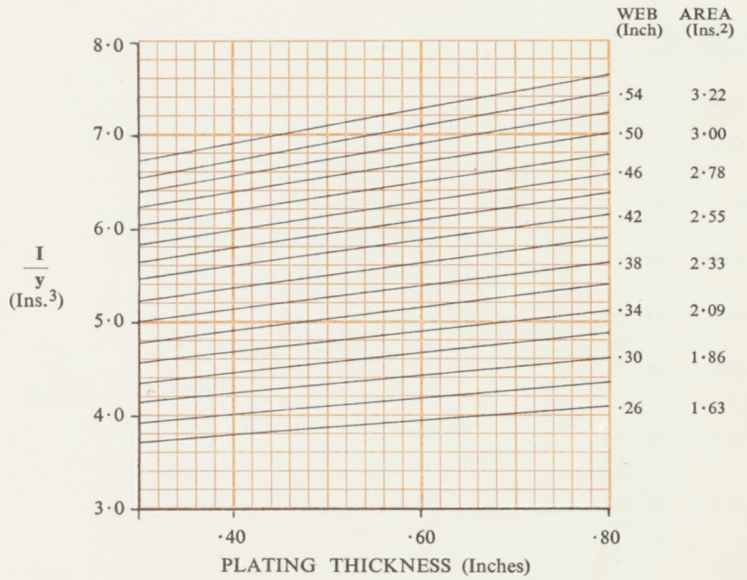
3″ DEPTH



3½″ DEPTH

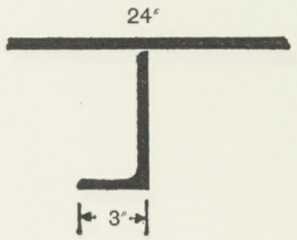


4″ DEPTH



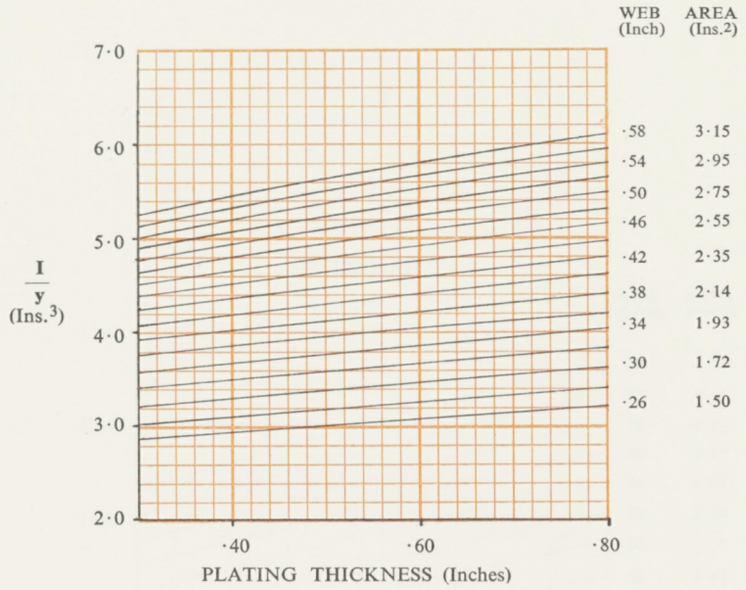
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

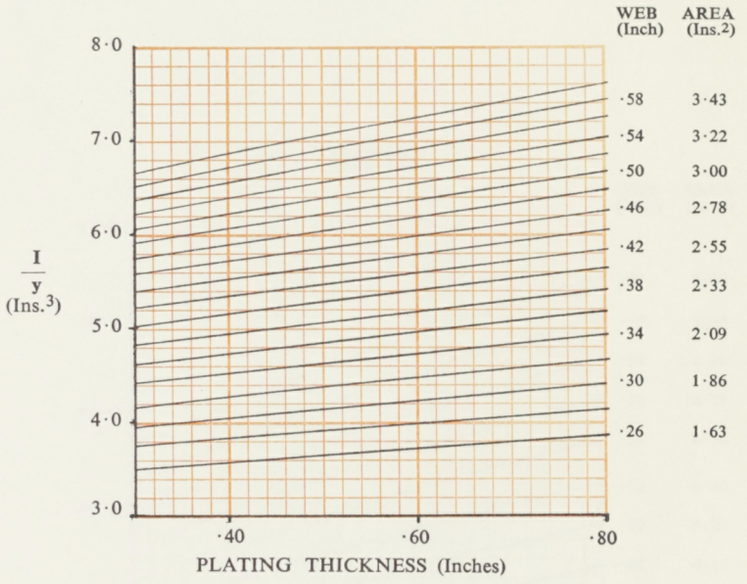


3″ FLANGE

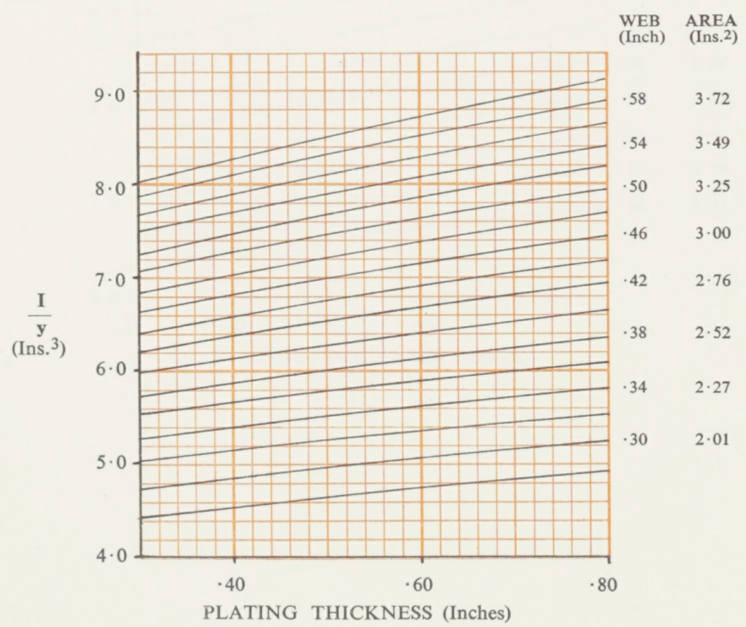
3″ DEPTH



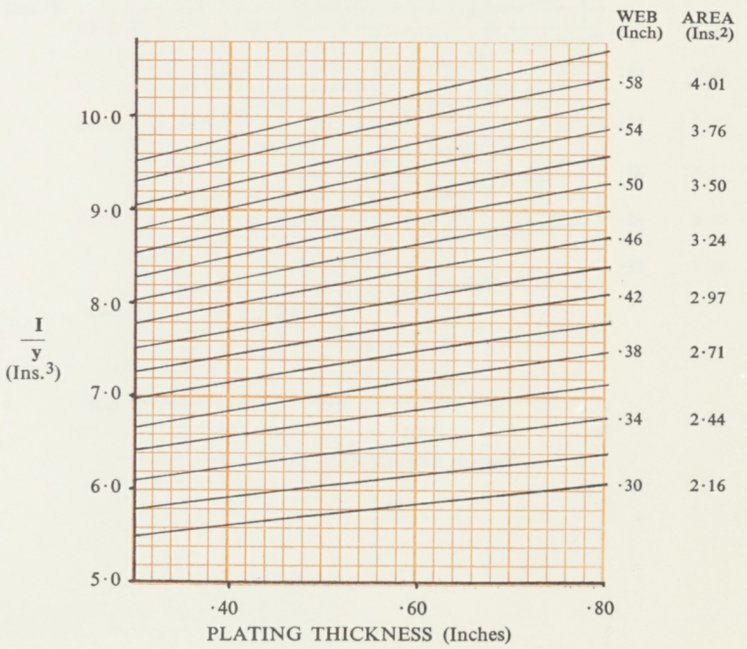
3½″ DEPTH



4″ DEPTH

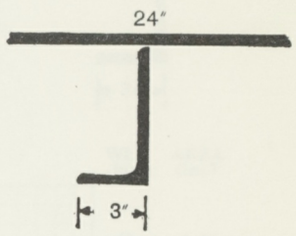


4½″ DEPTH



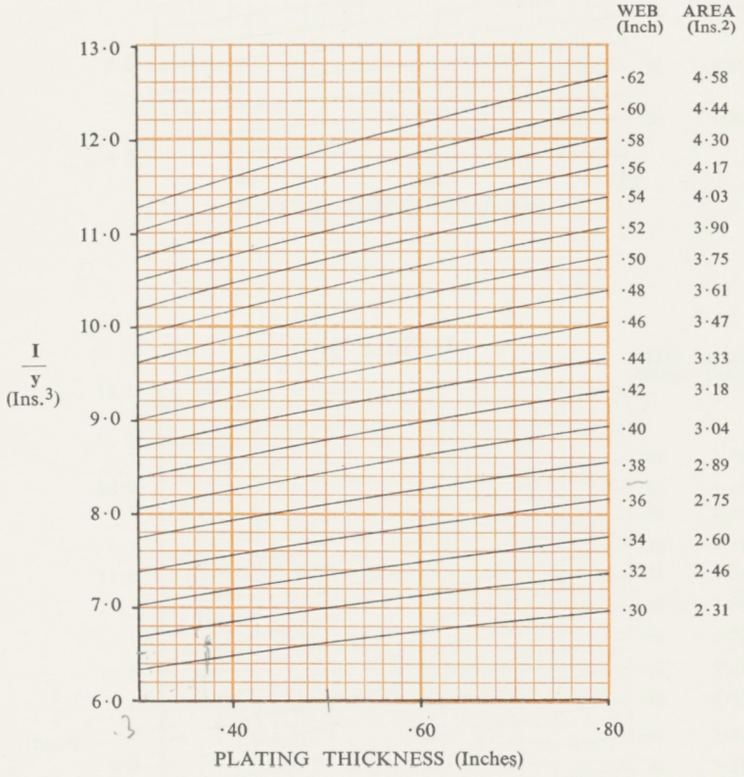
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

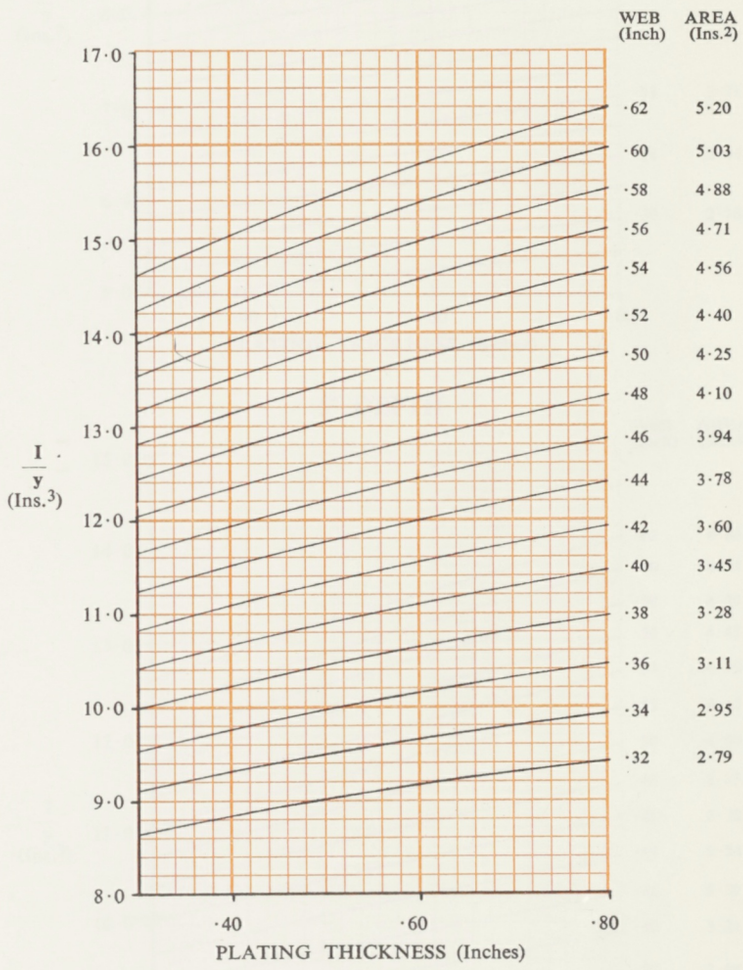


3″ FLANGE

5″ DEPTH

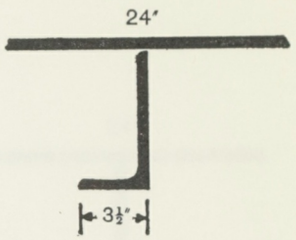


6″ DEPTH



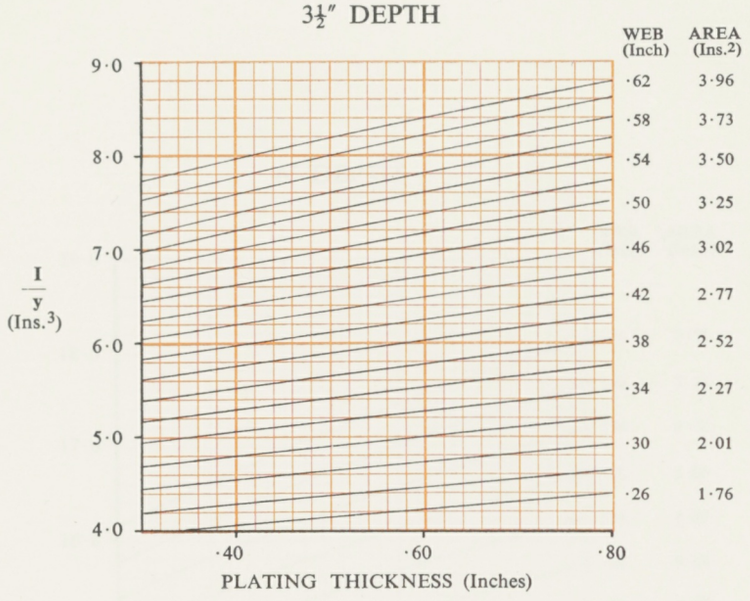
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

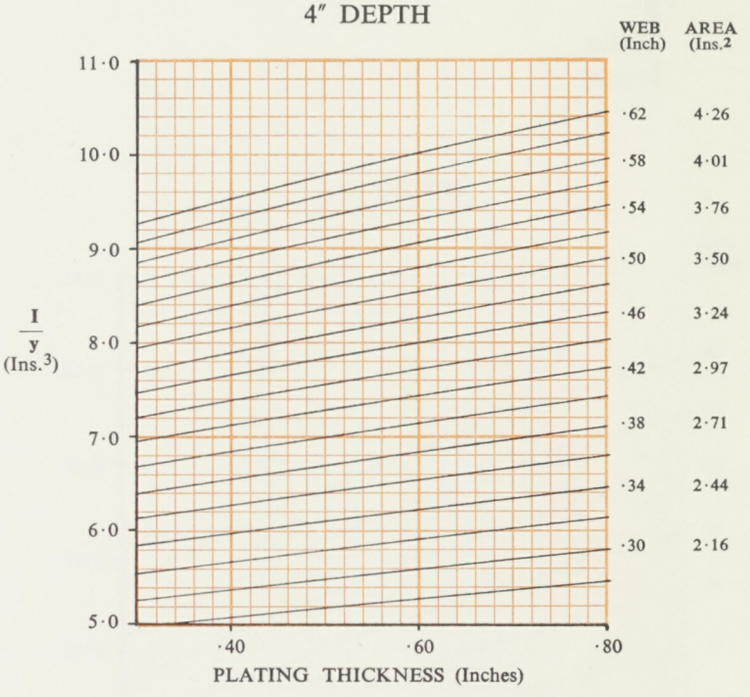


3½″ FLANGE

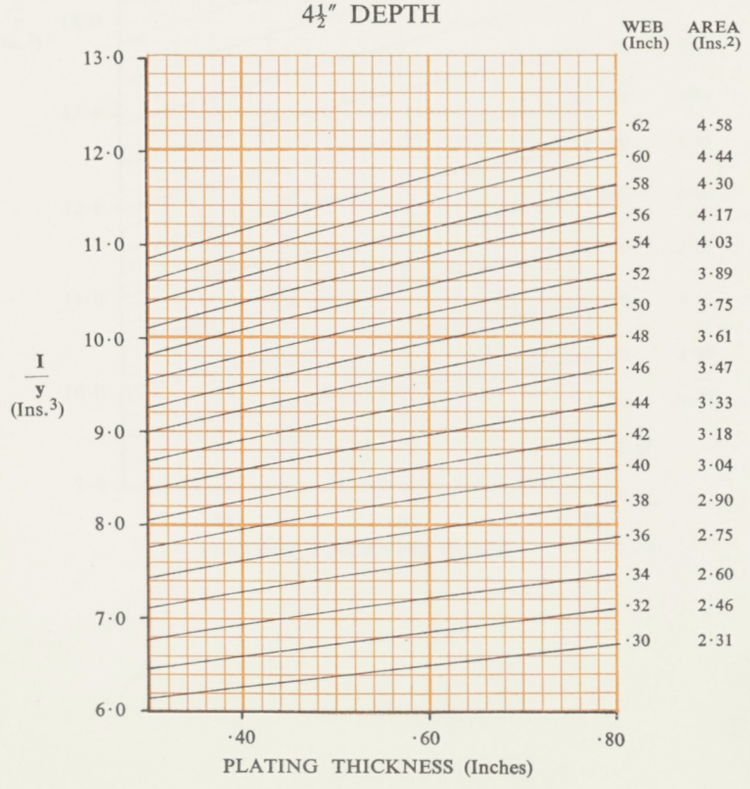
3½″ DEPTH



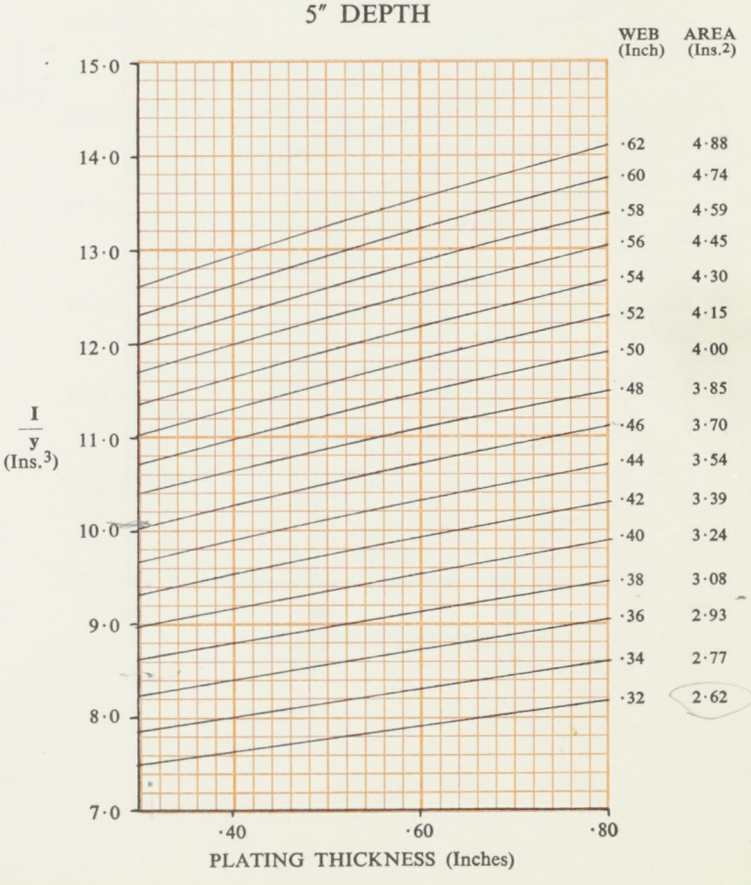
4″ DEPTH

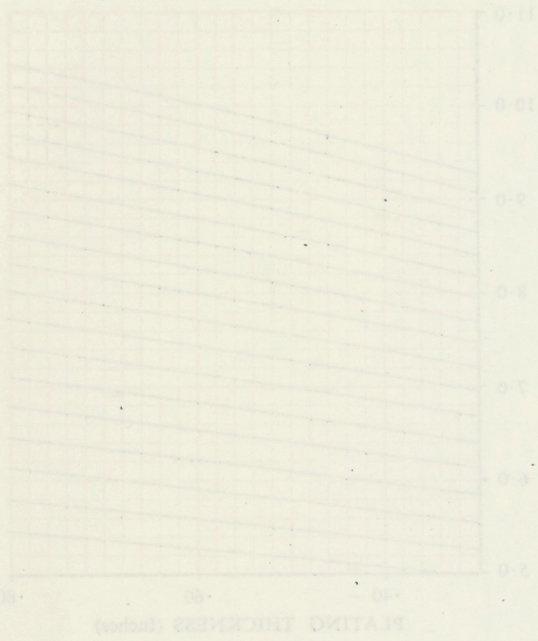


4½″ DEPTH



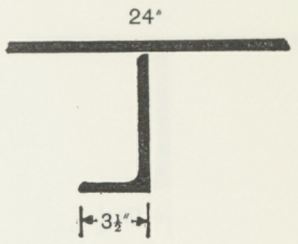
5″ DEPTH





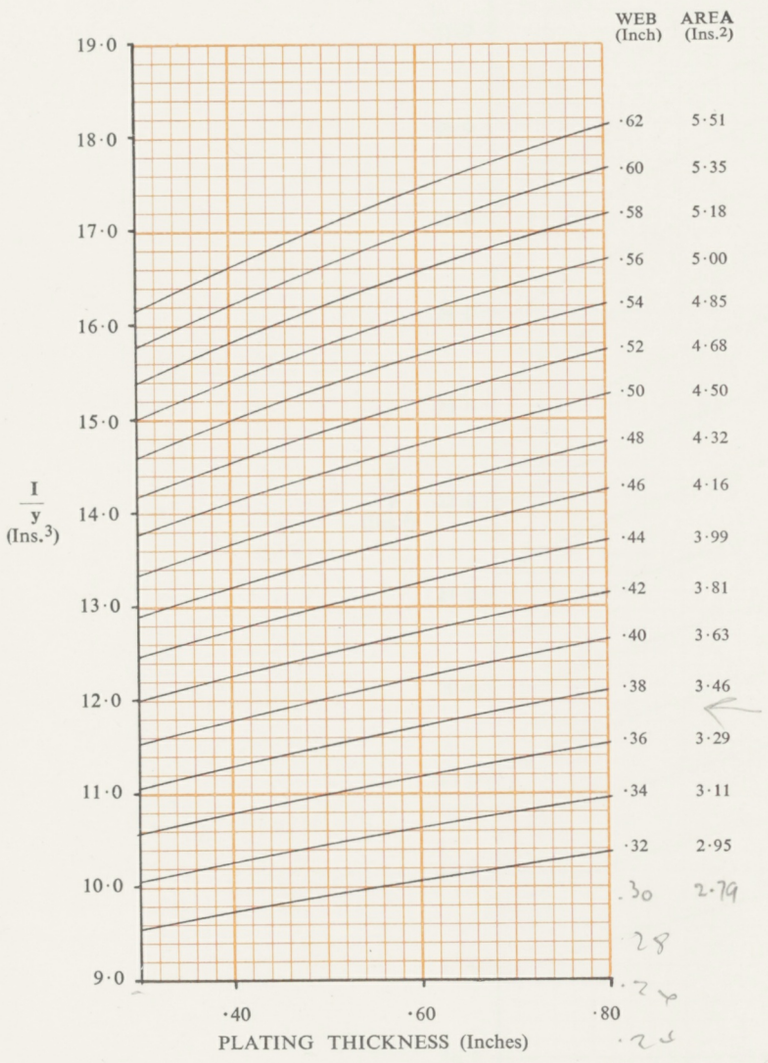
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

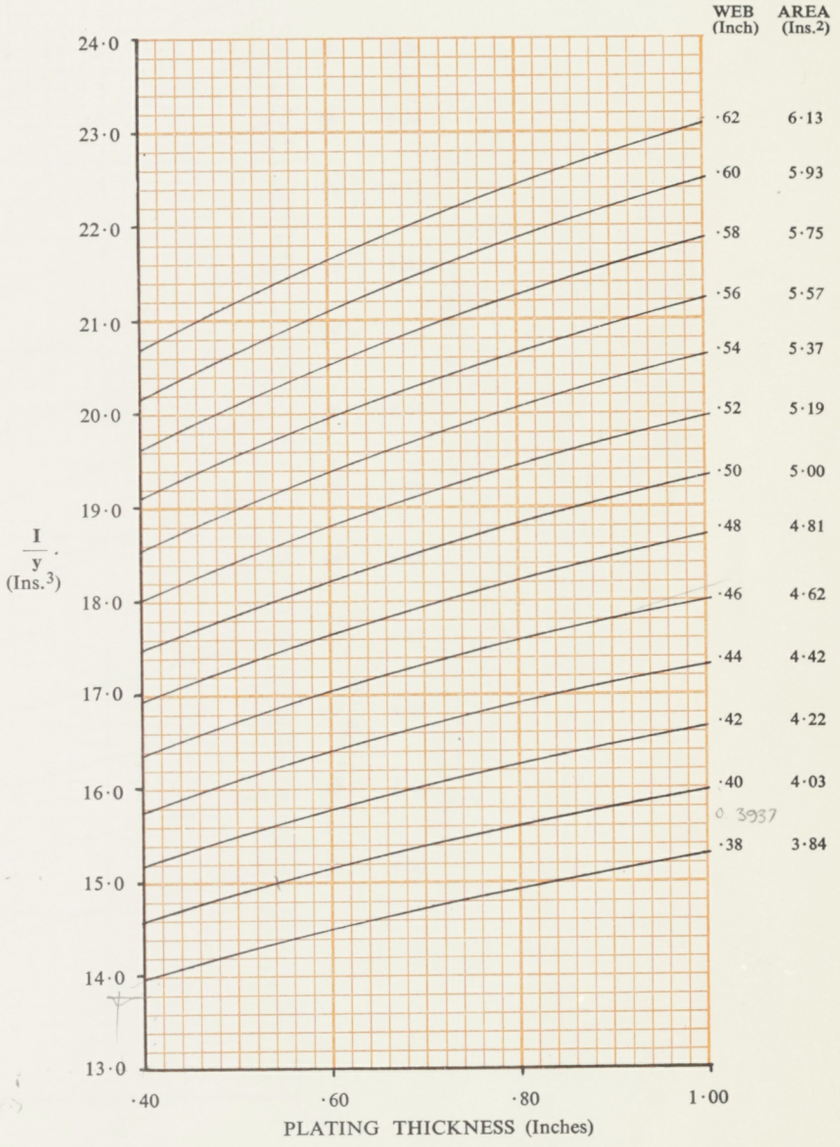


3½" FLANGE

6" DEPTH

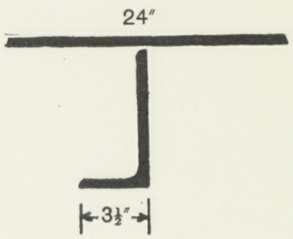


7" DEPTH



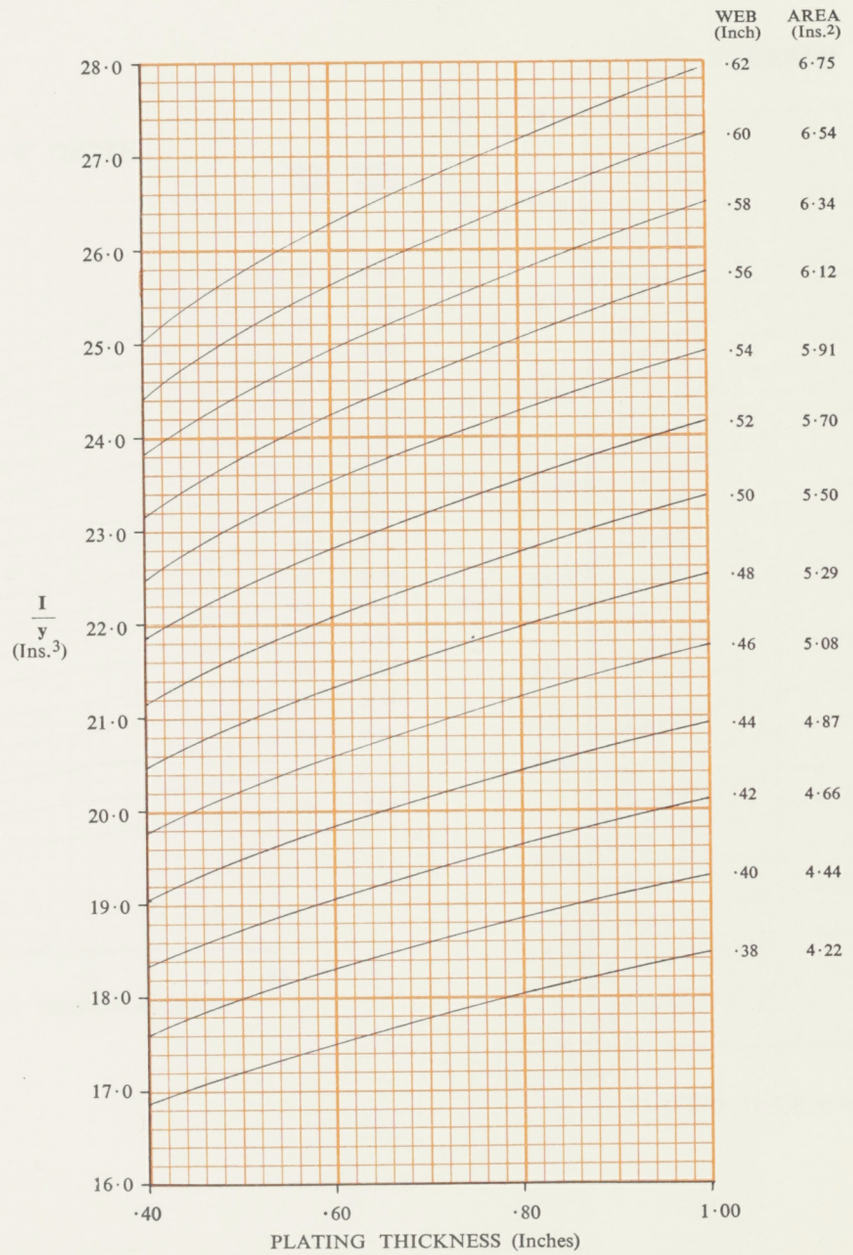
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING —AREA WITHOUT PLATING)



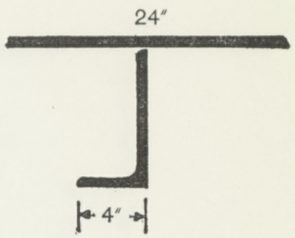
3½″ FLANGE

8″ DEPTH



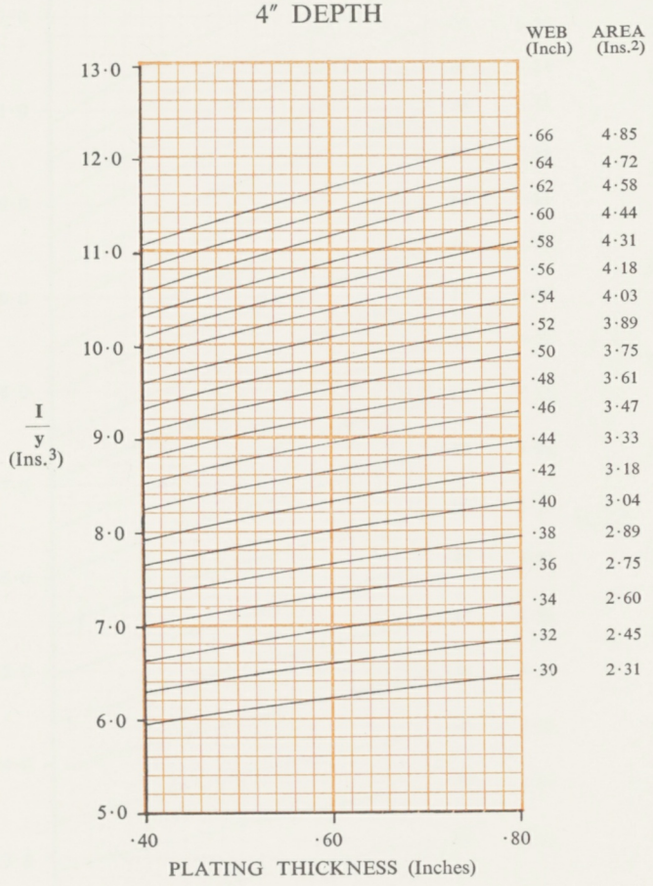
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

4″ DEPTH



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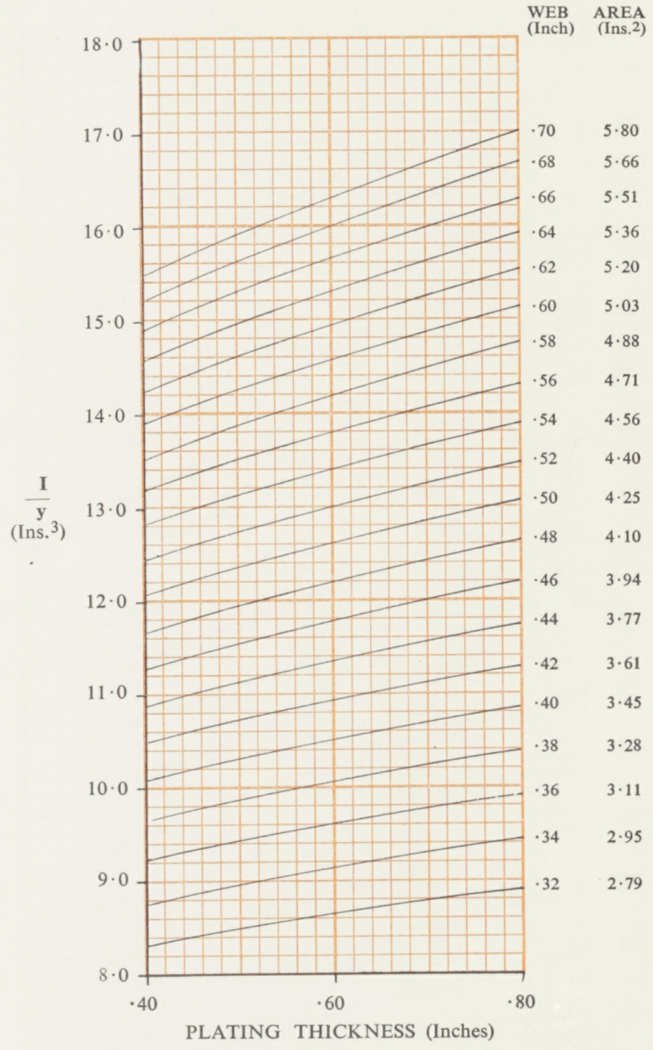
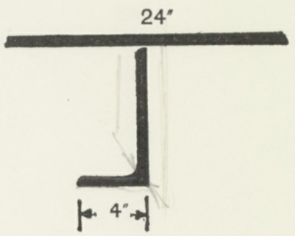


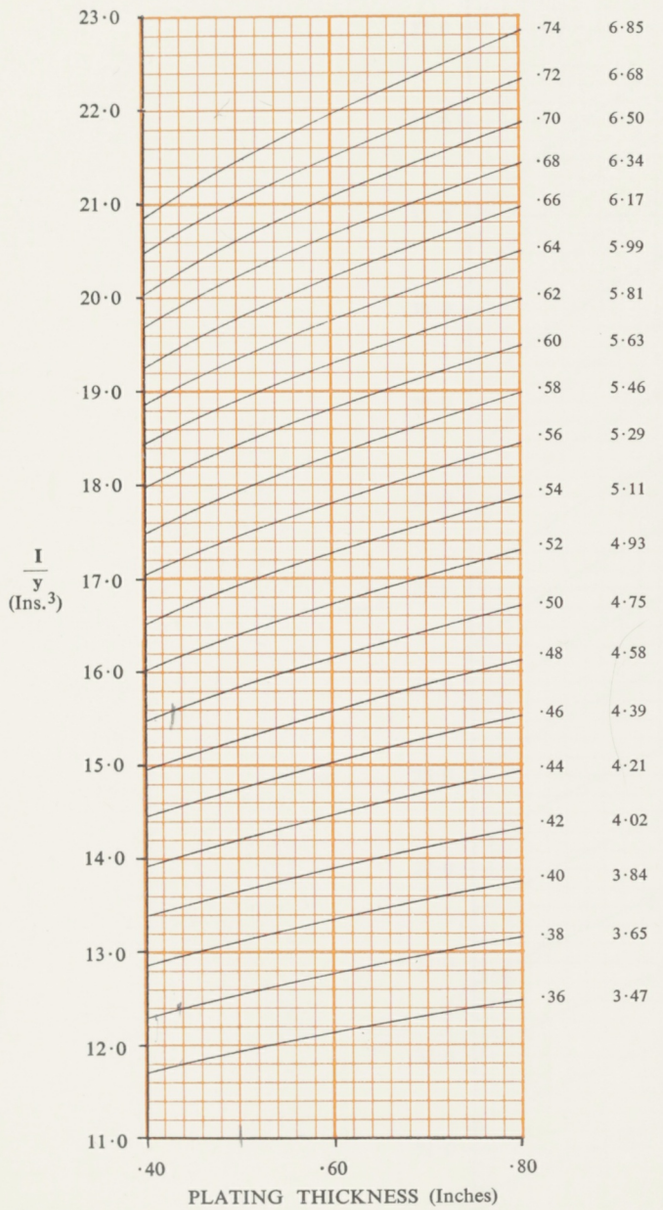
SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

6″ DEPTH



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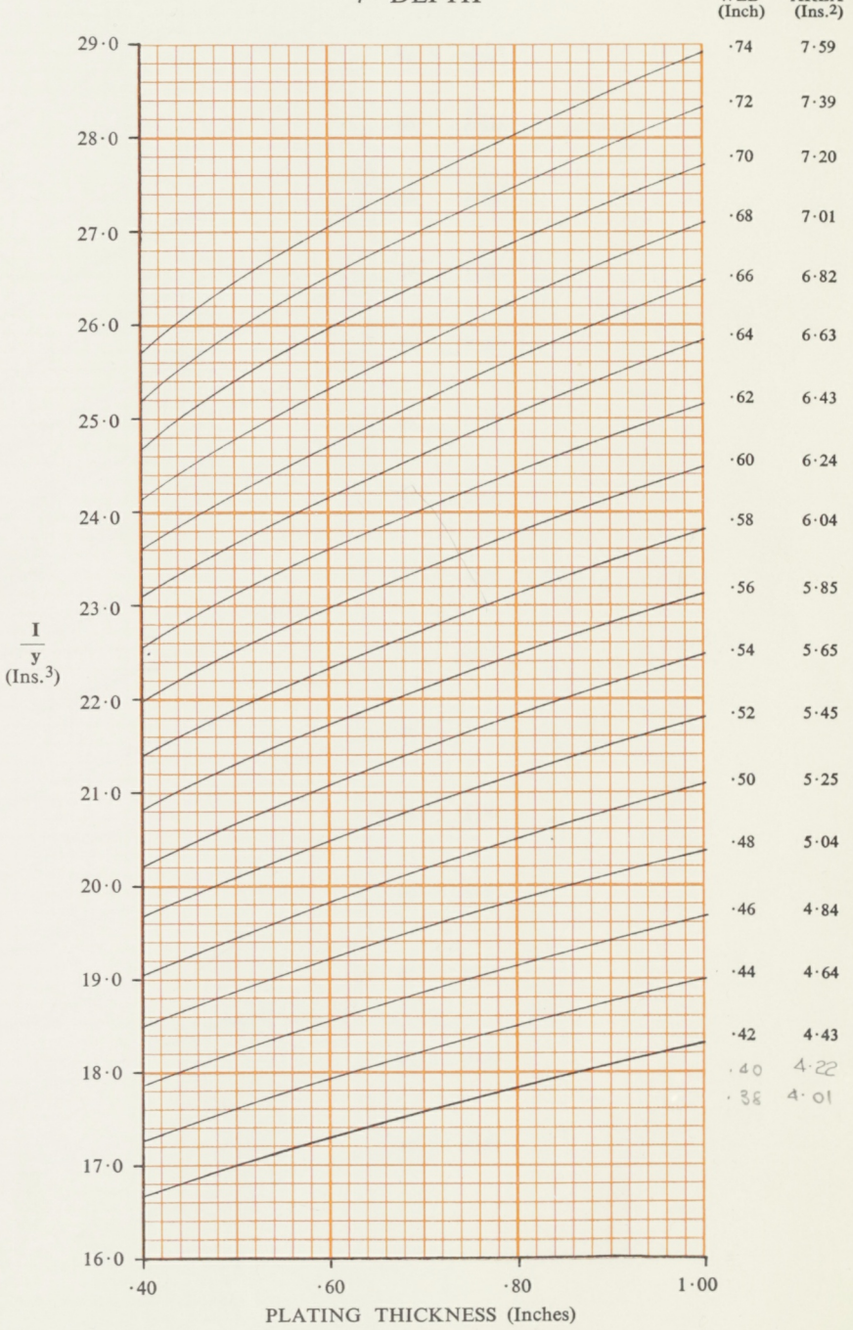
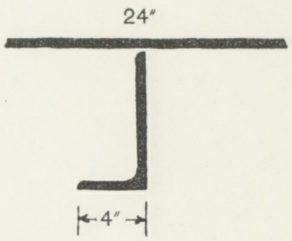


SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

4″ FLANGE



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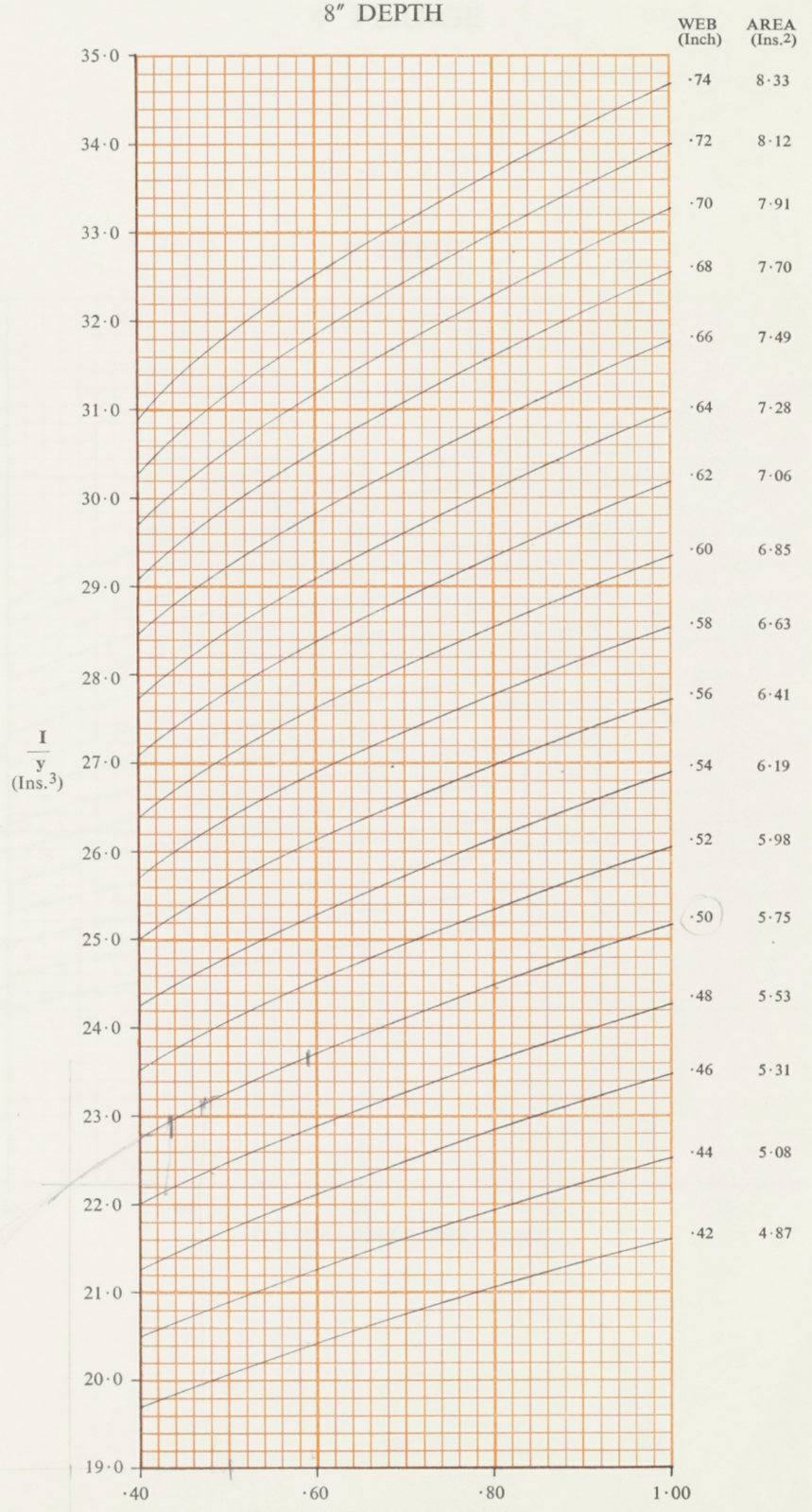
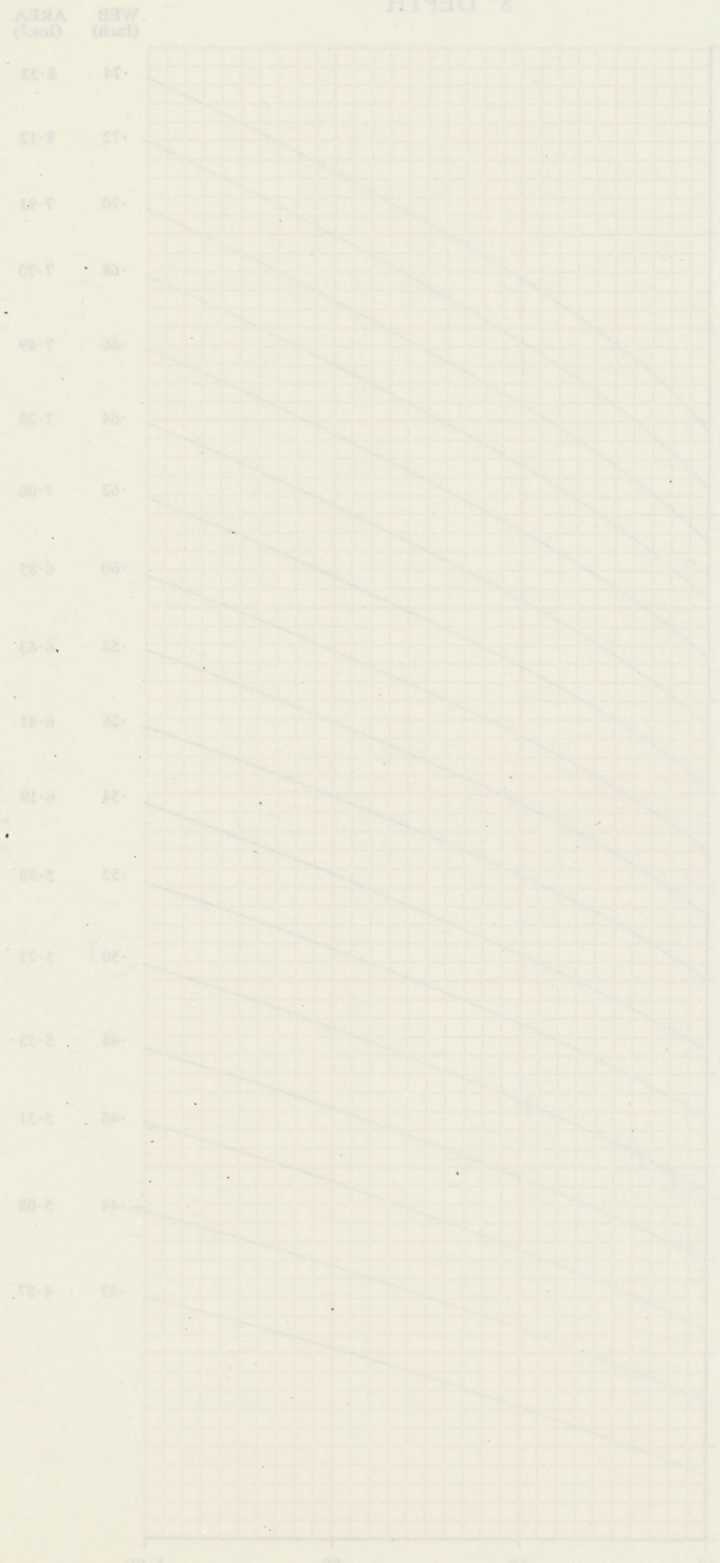
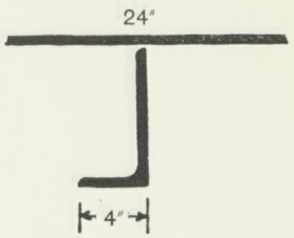


24"



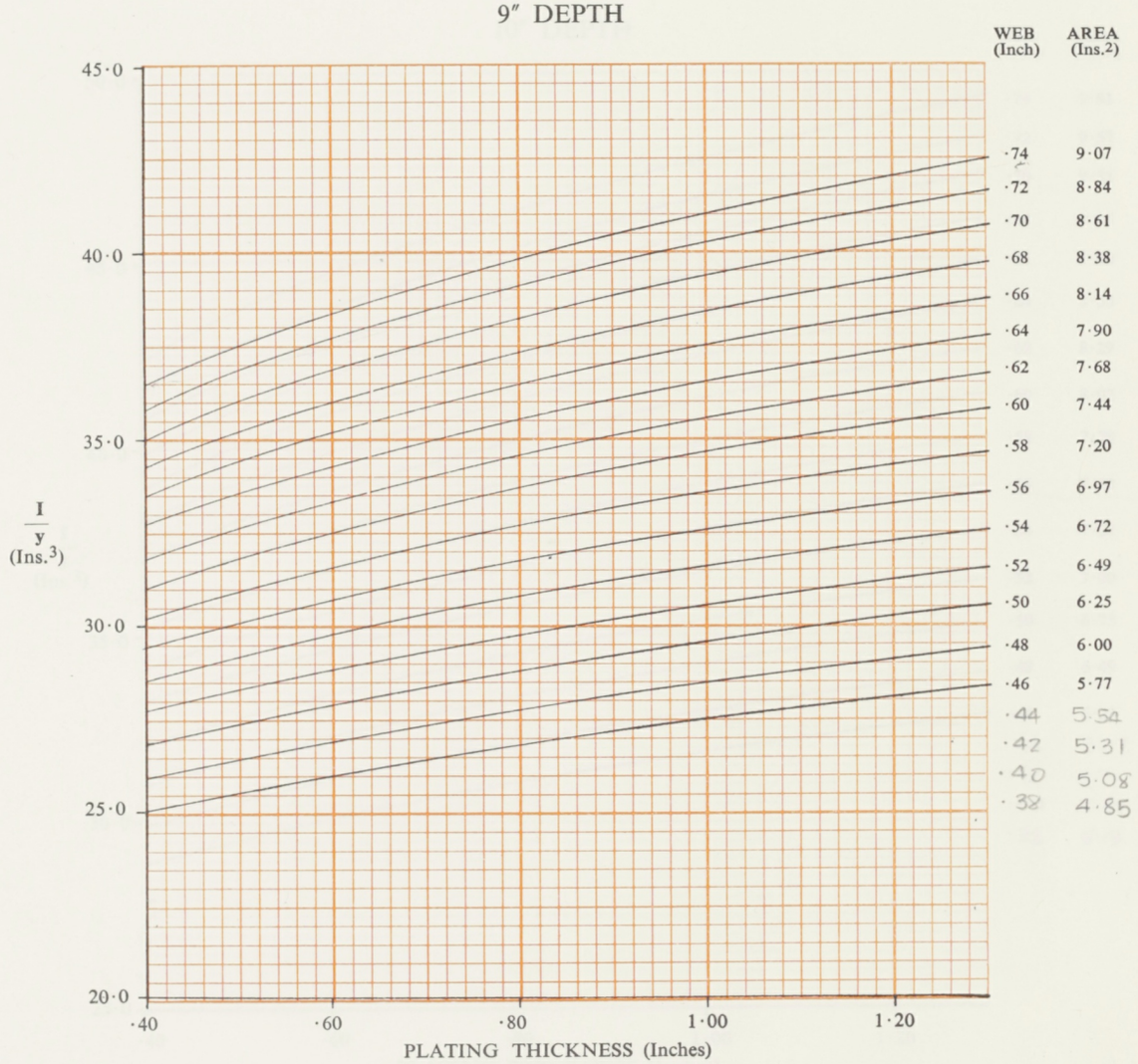
SECTION MODULUS AND AREA OF INVERTED ANGLES

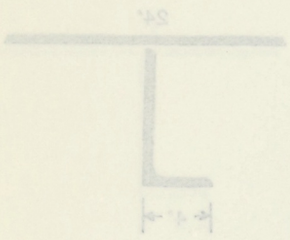
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

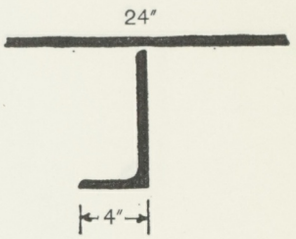
9″ DEPTH



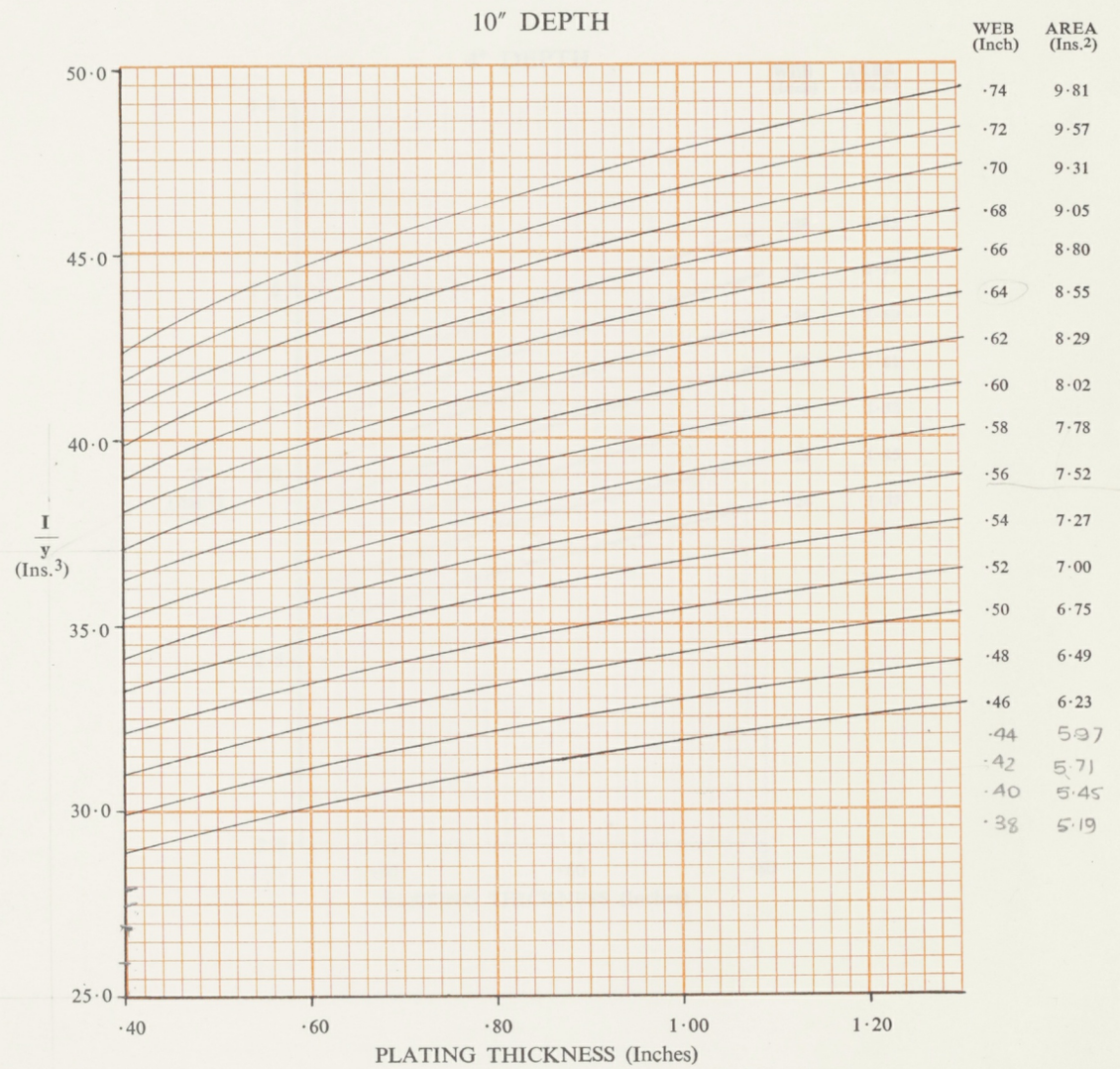

24"
4"

SECTION MODULUS AND AREA OF INVERTED ANGLES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



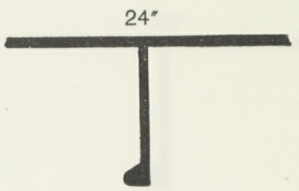
4″ FLANGE

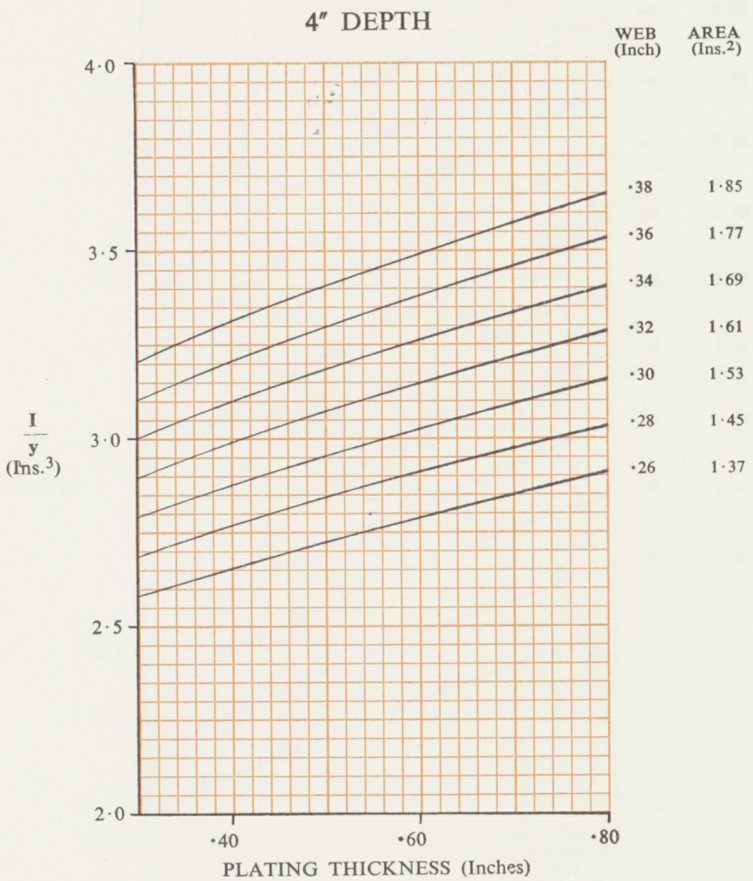


24"
t=.4"

SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

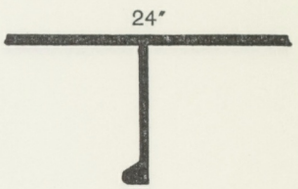
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)





SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



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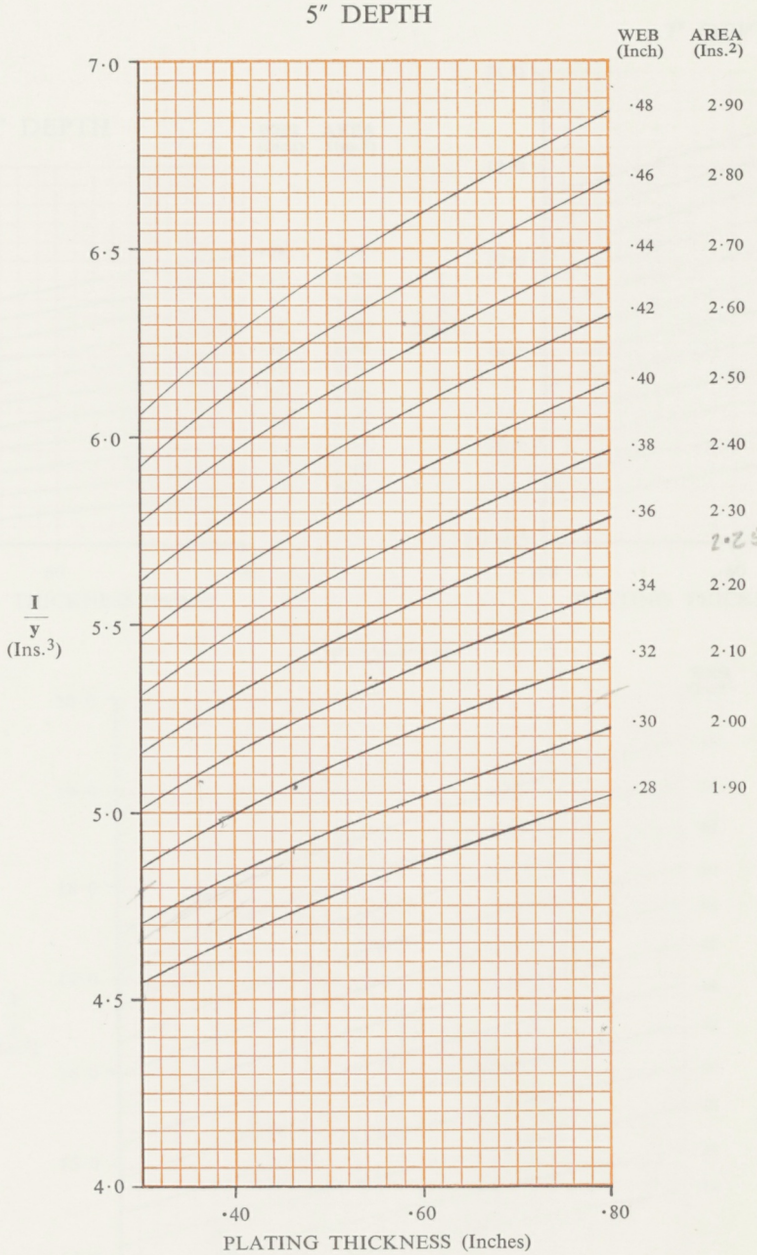
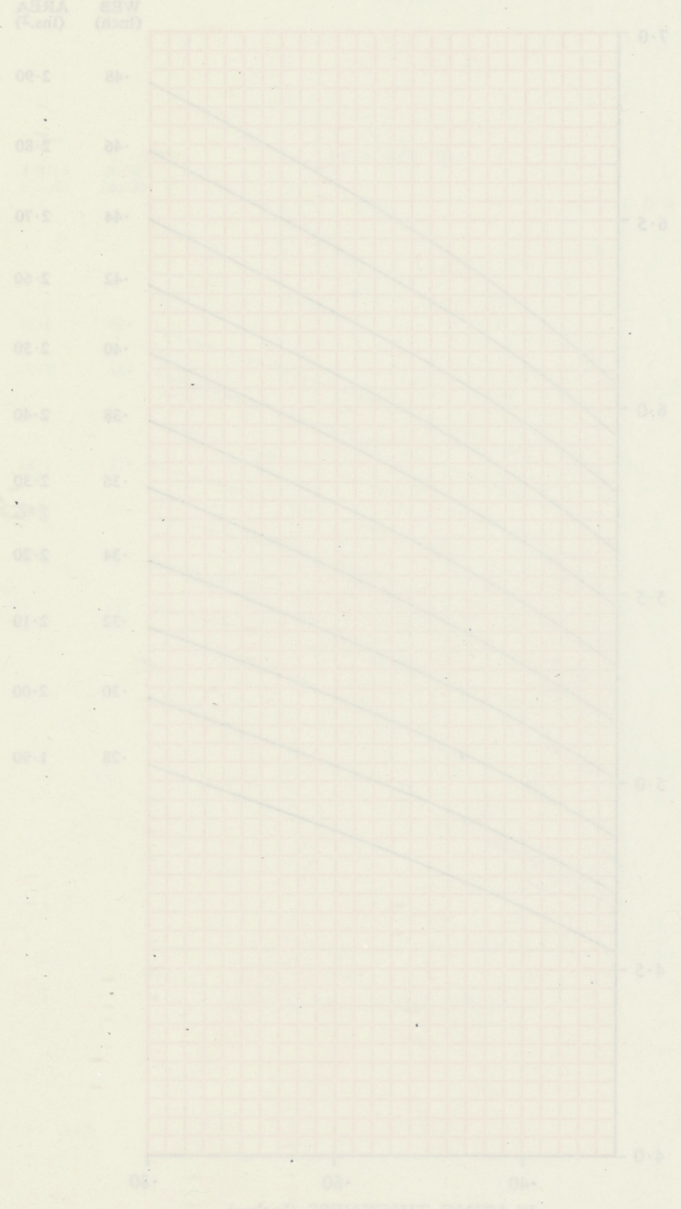
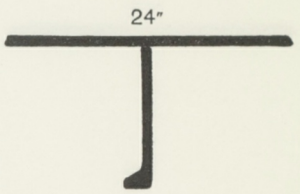




SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



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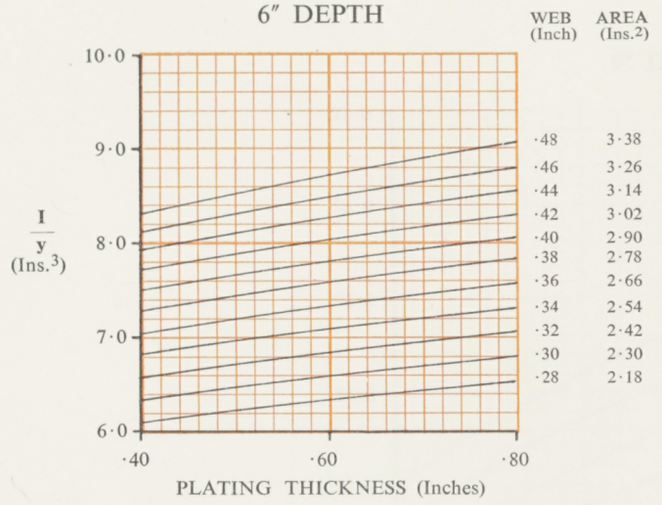

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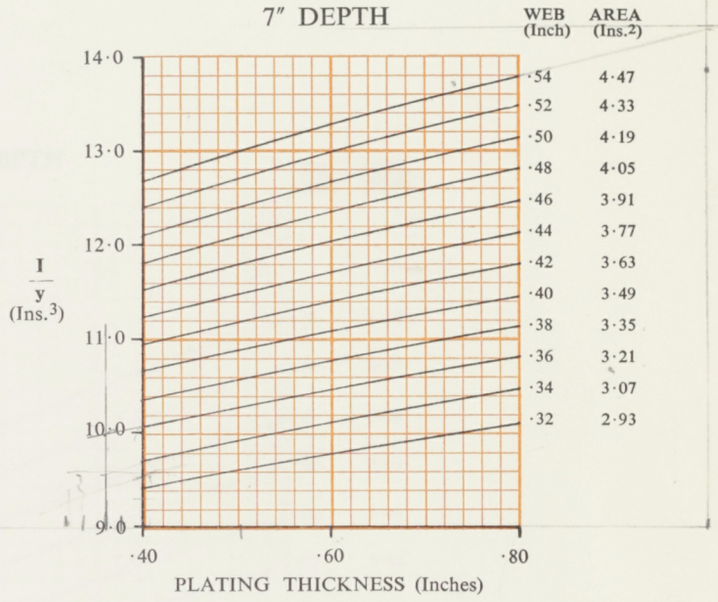

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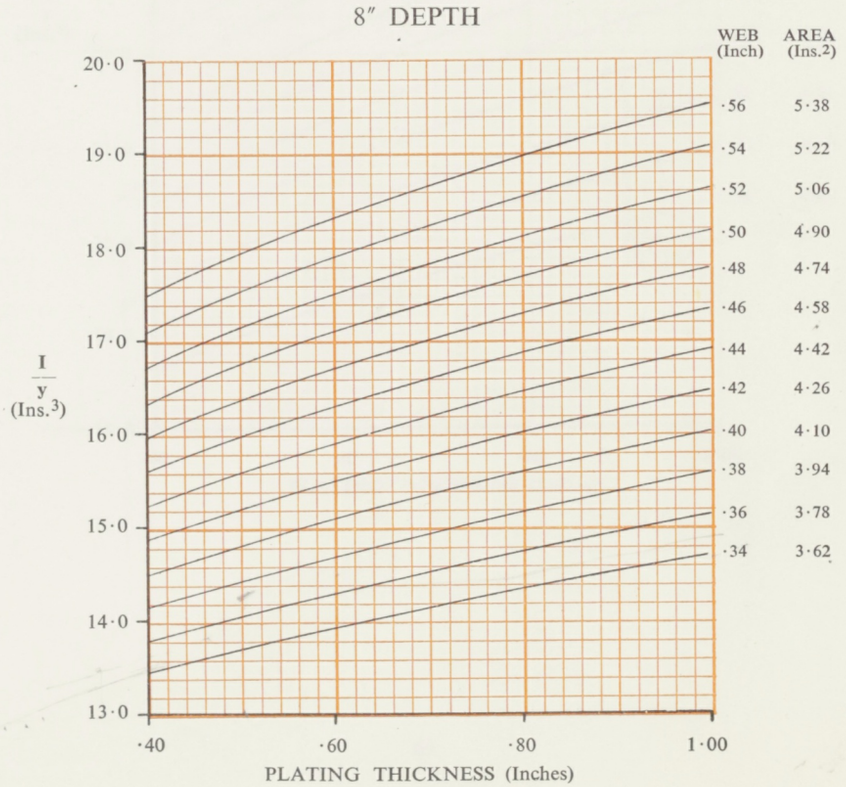
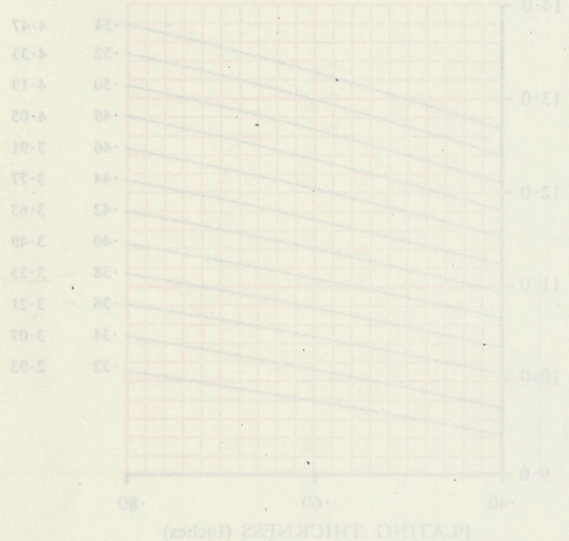
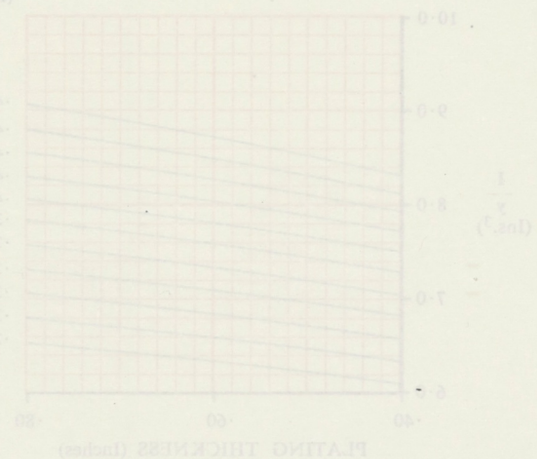
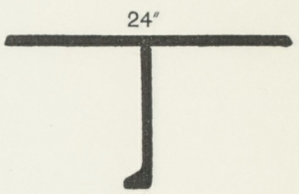


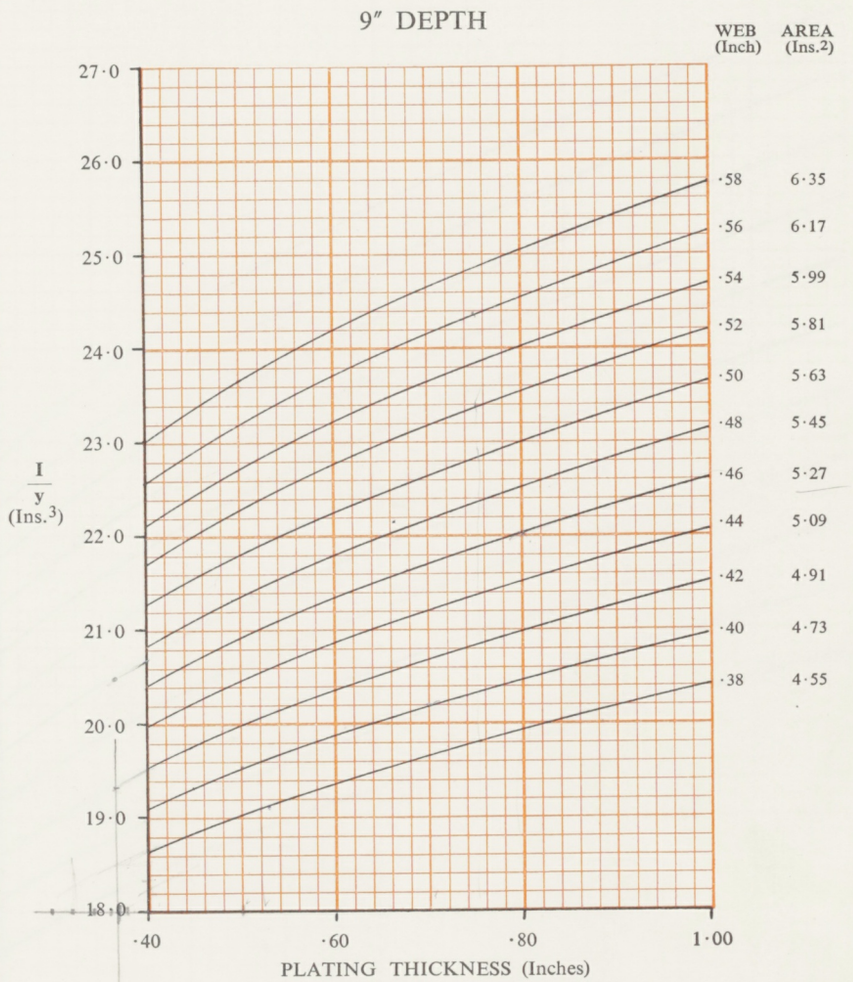




SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

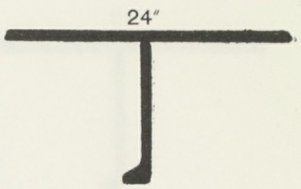
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

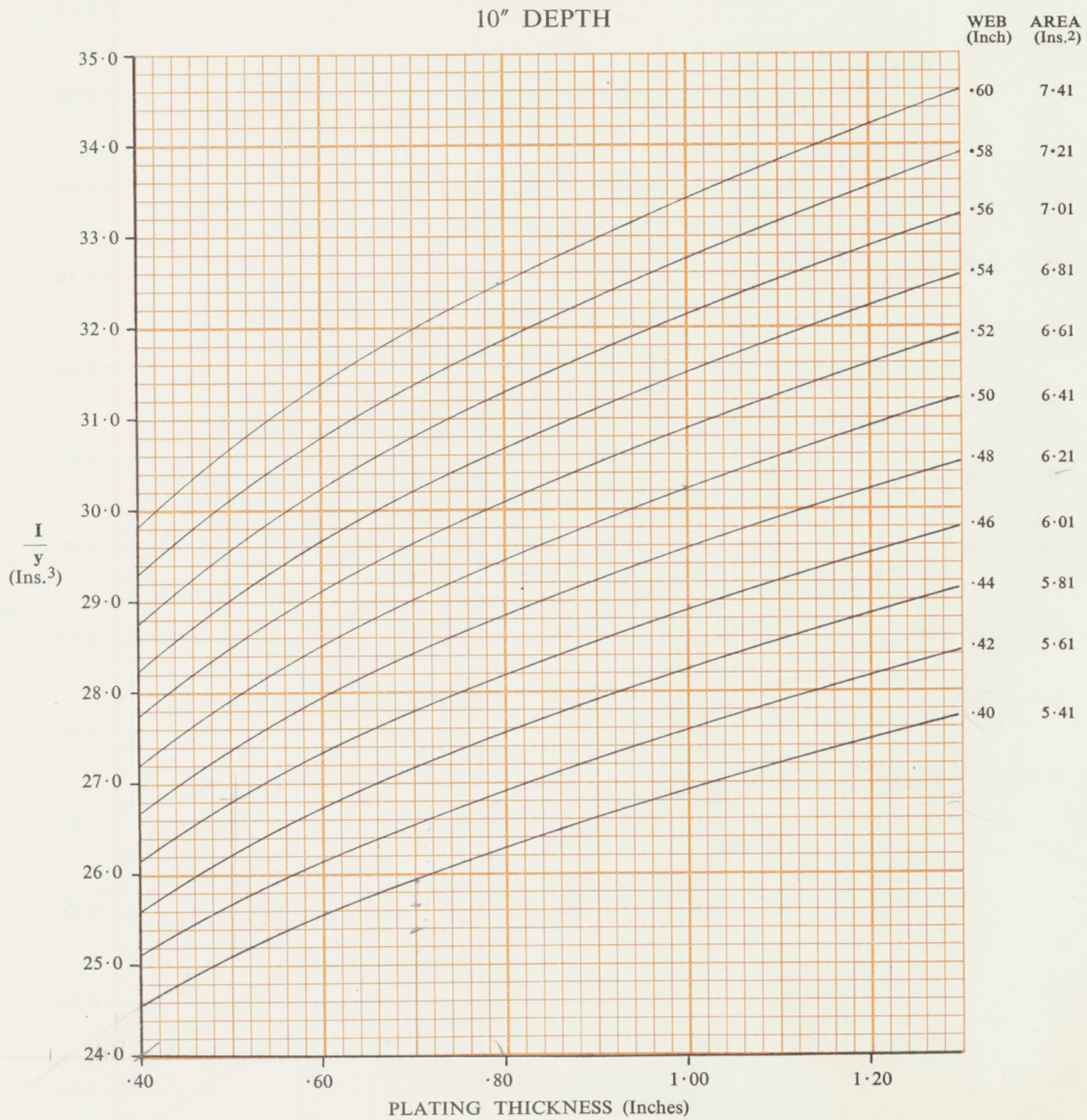


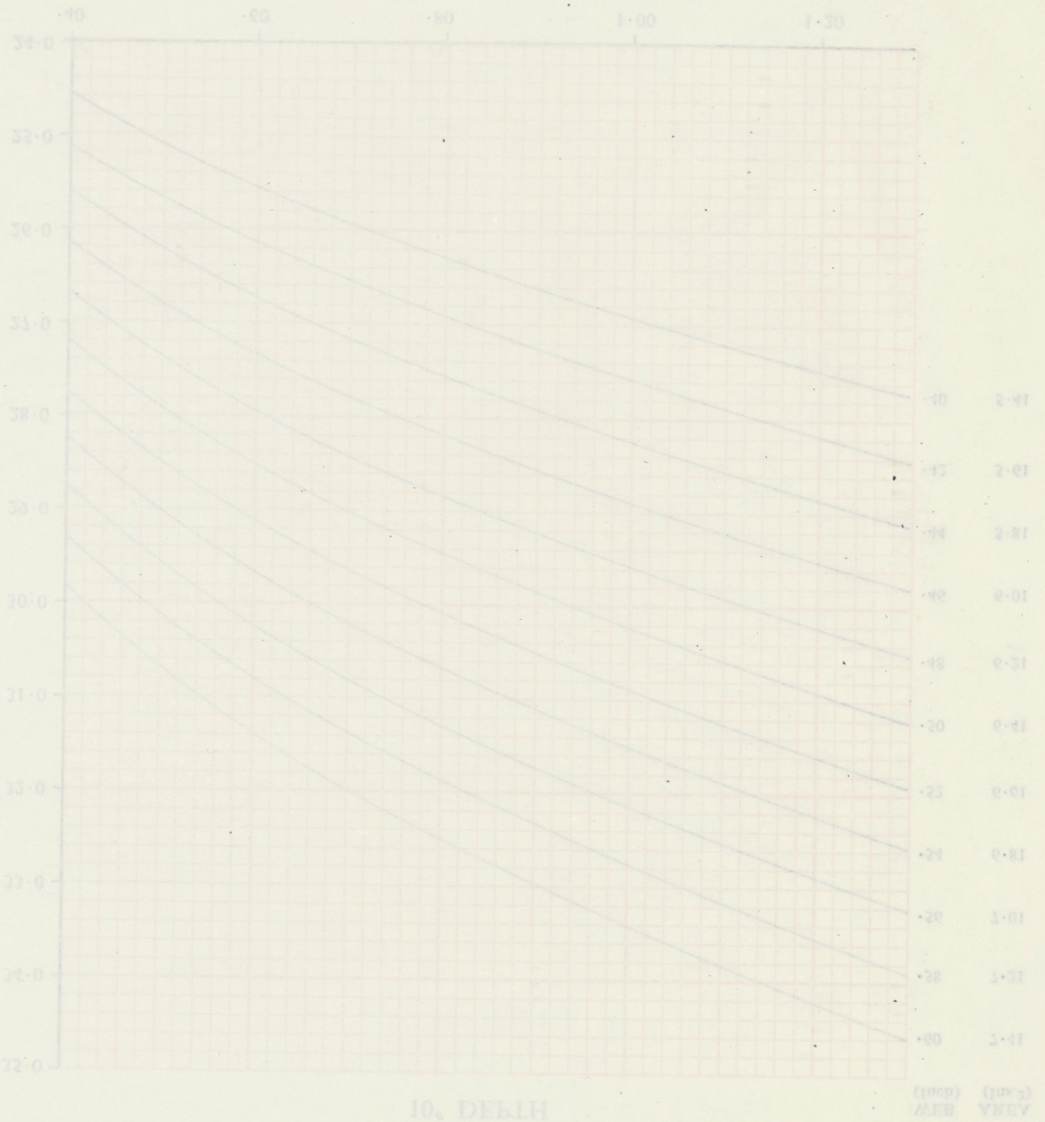


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

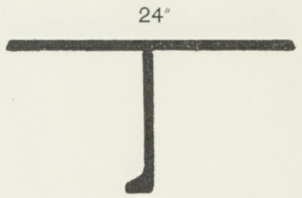




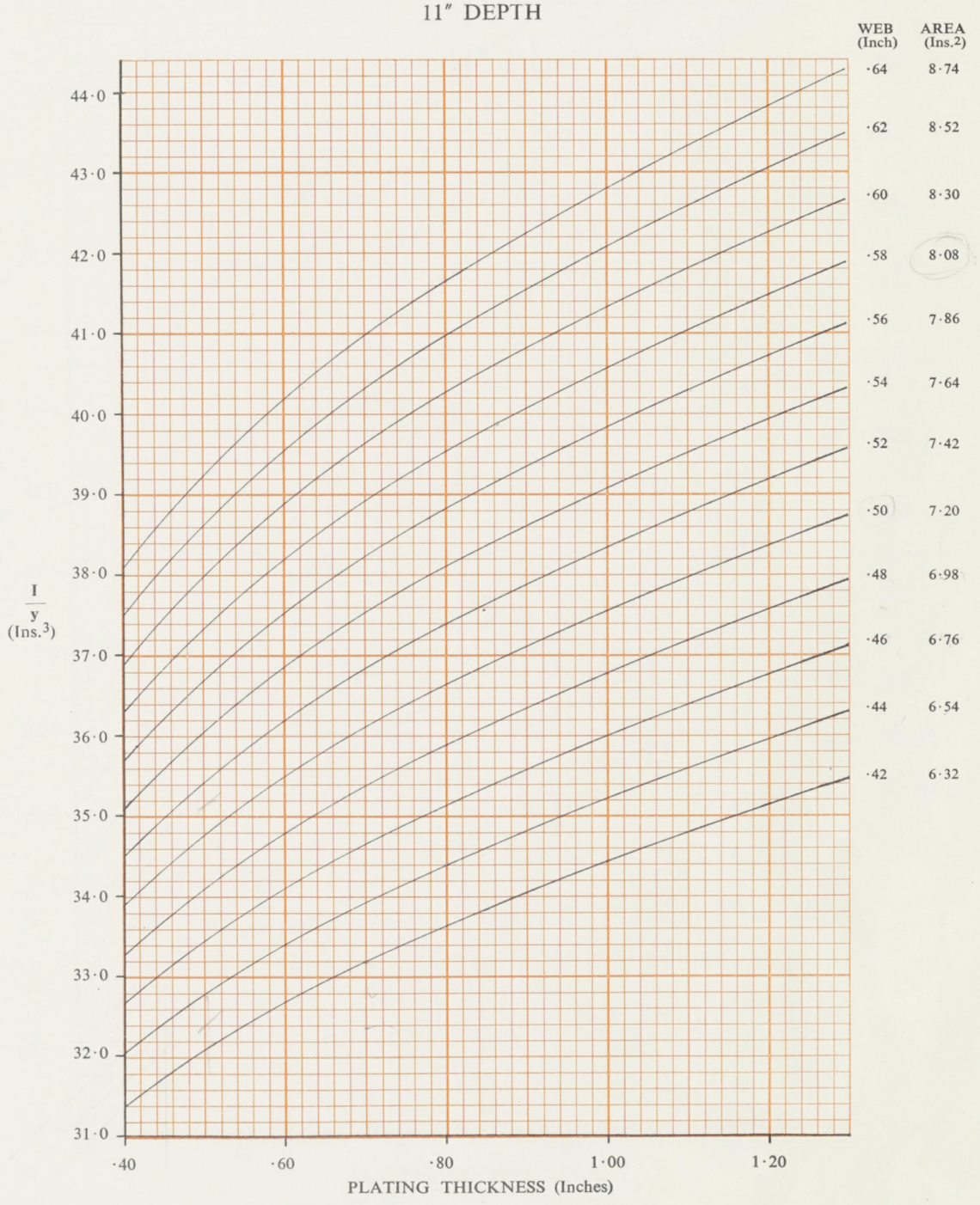


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

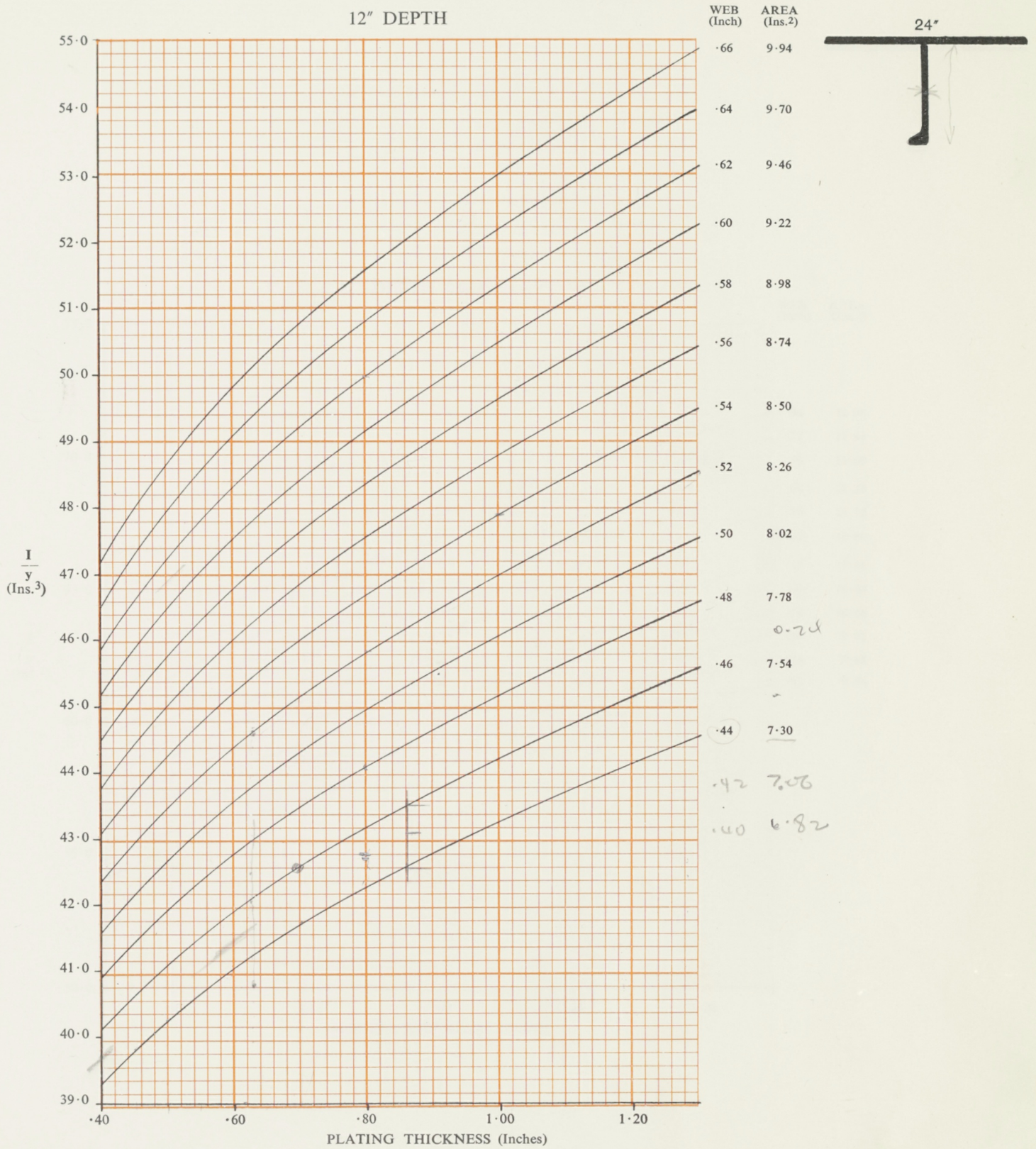


11″ DEPTH



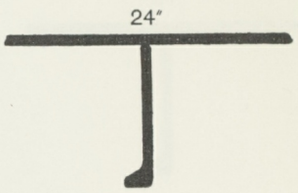
SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

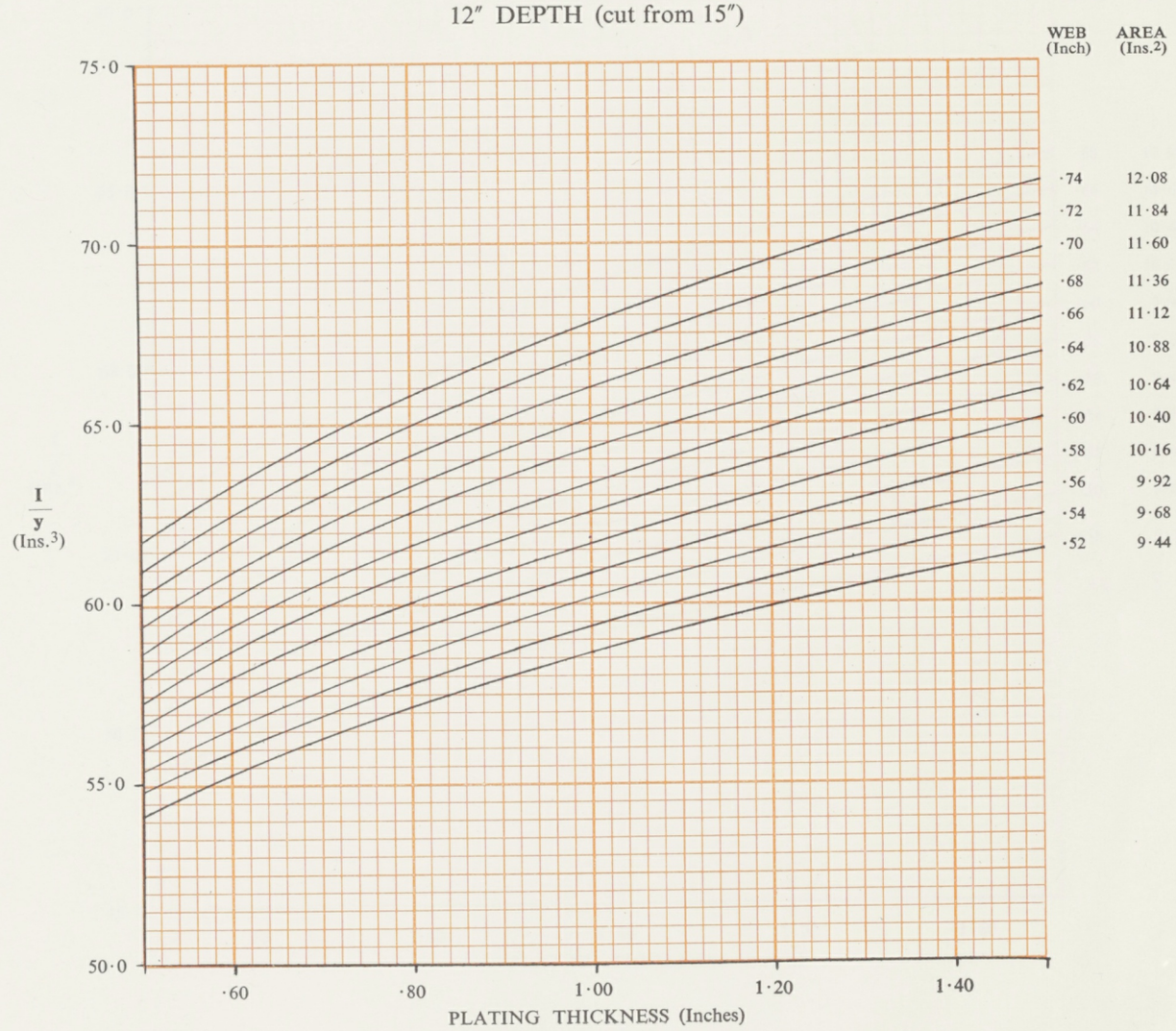


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

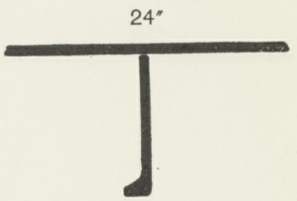


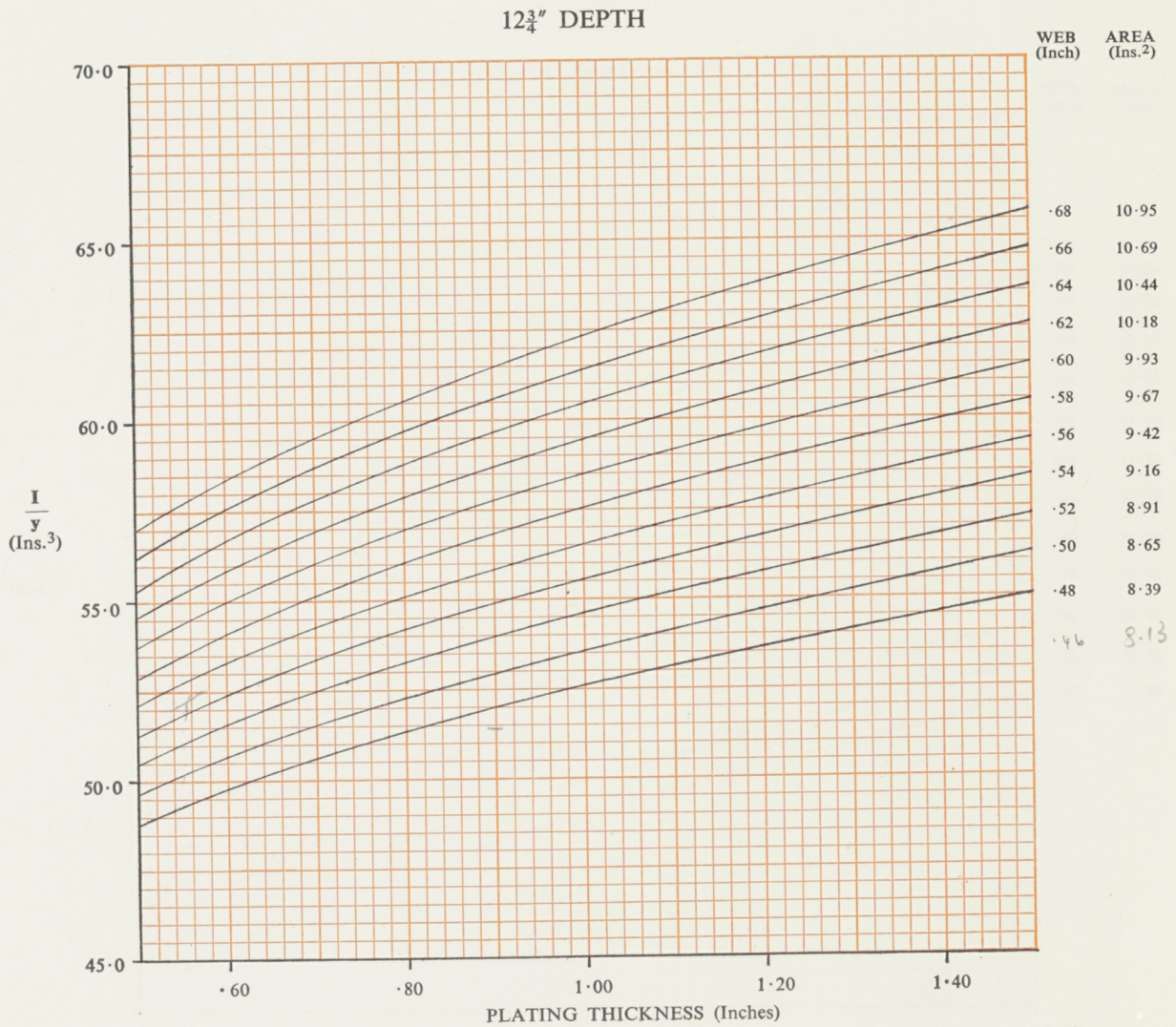
12″ DEPTH (cut from 15″)



SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

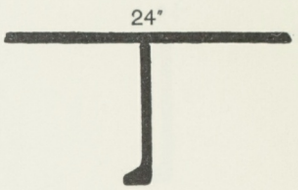
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



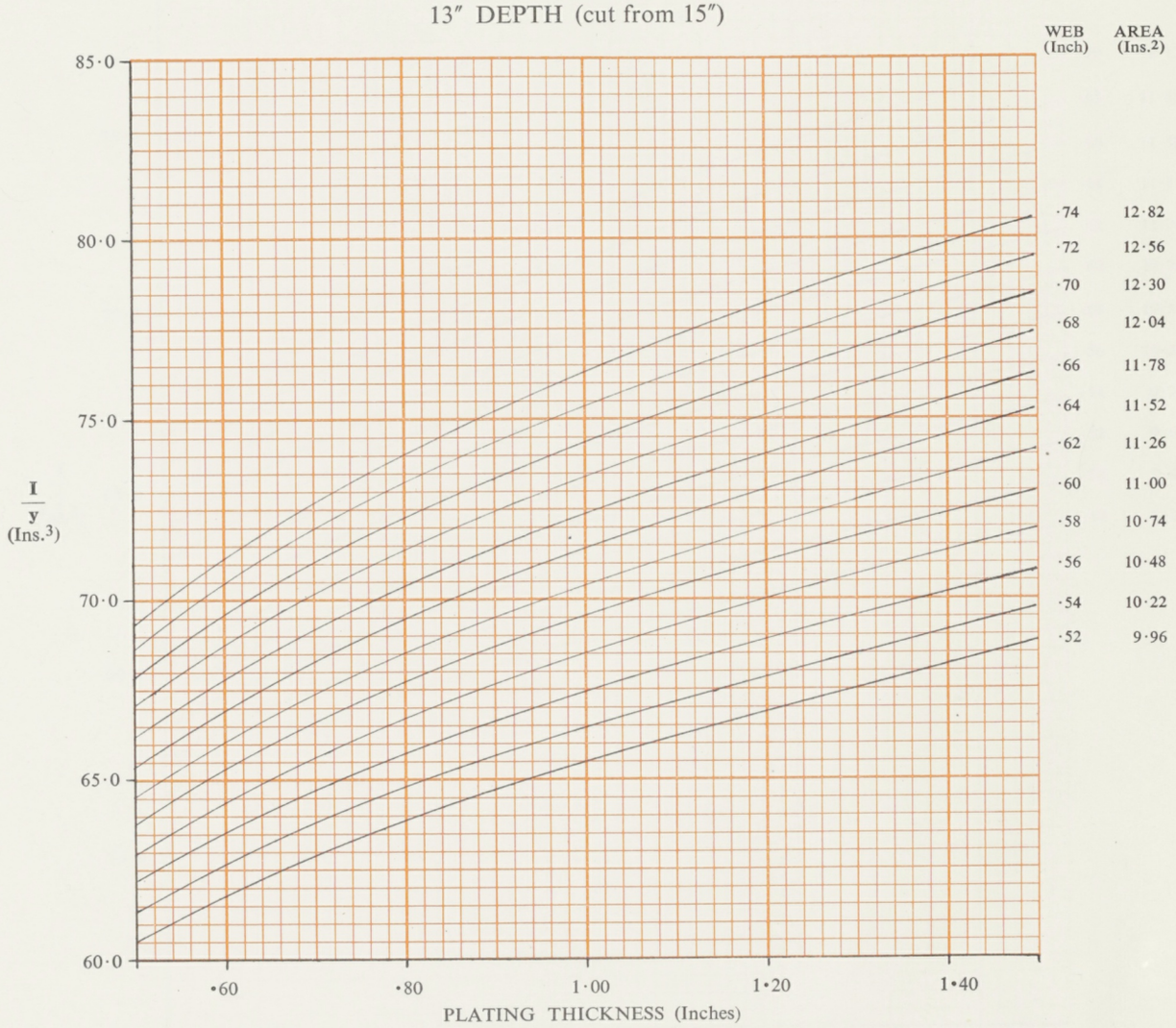


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

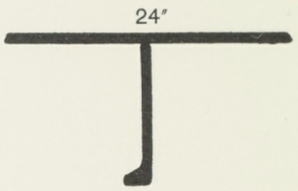


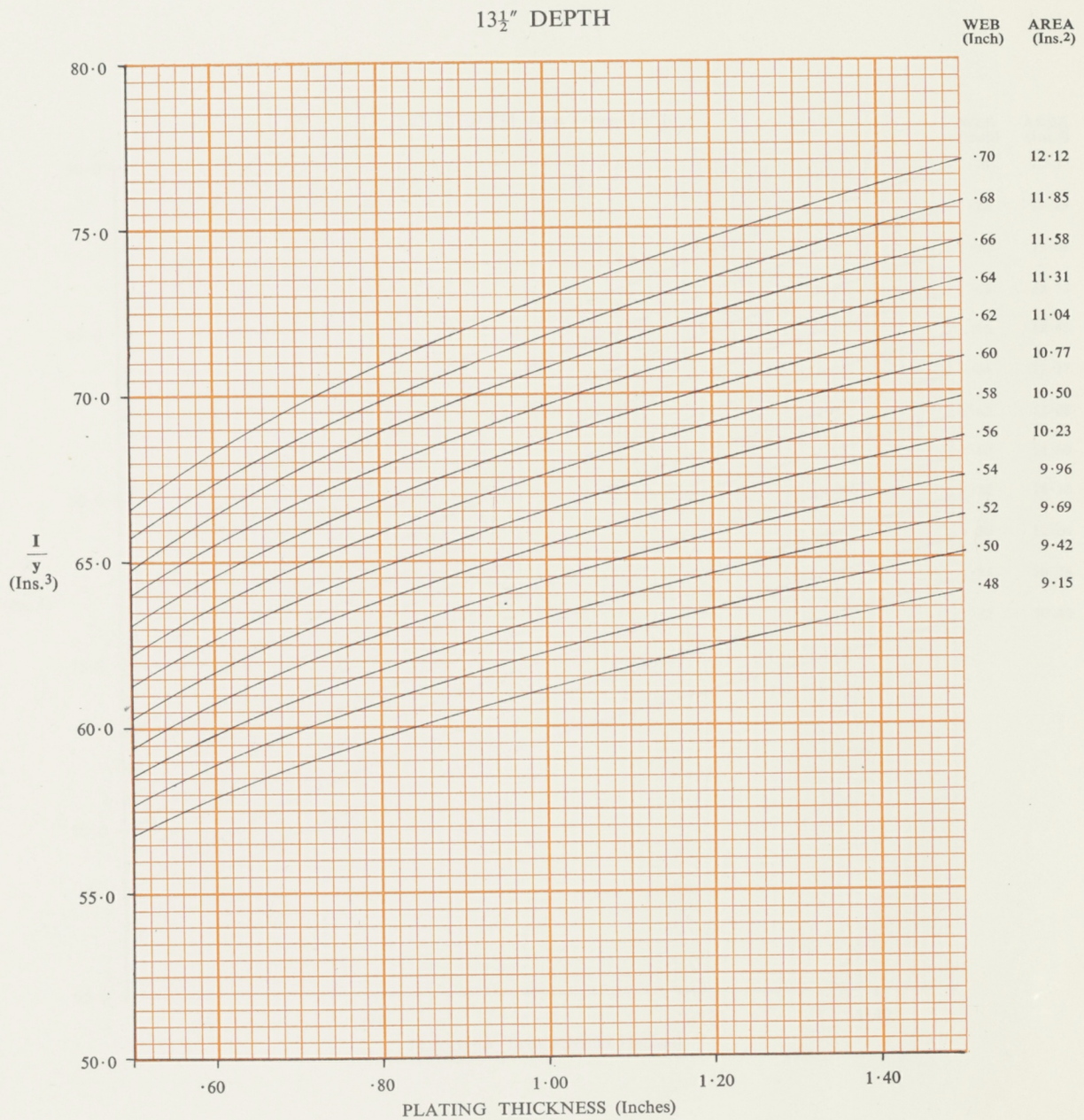
13″ DEPTH (cut from 15″)



SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

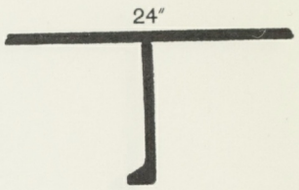
SECTION MODULUS WITH PLATING— AREA WITHOUT PLATING)



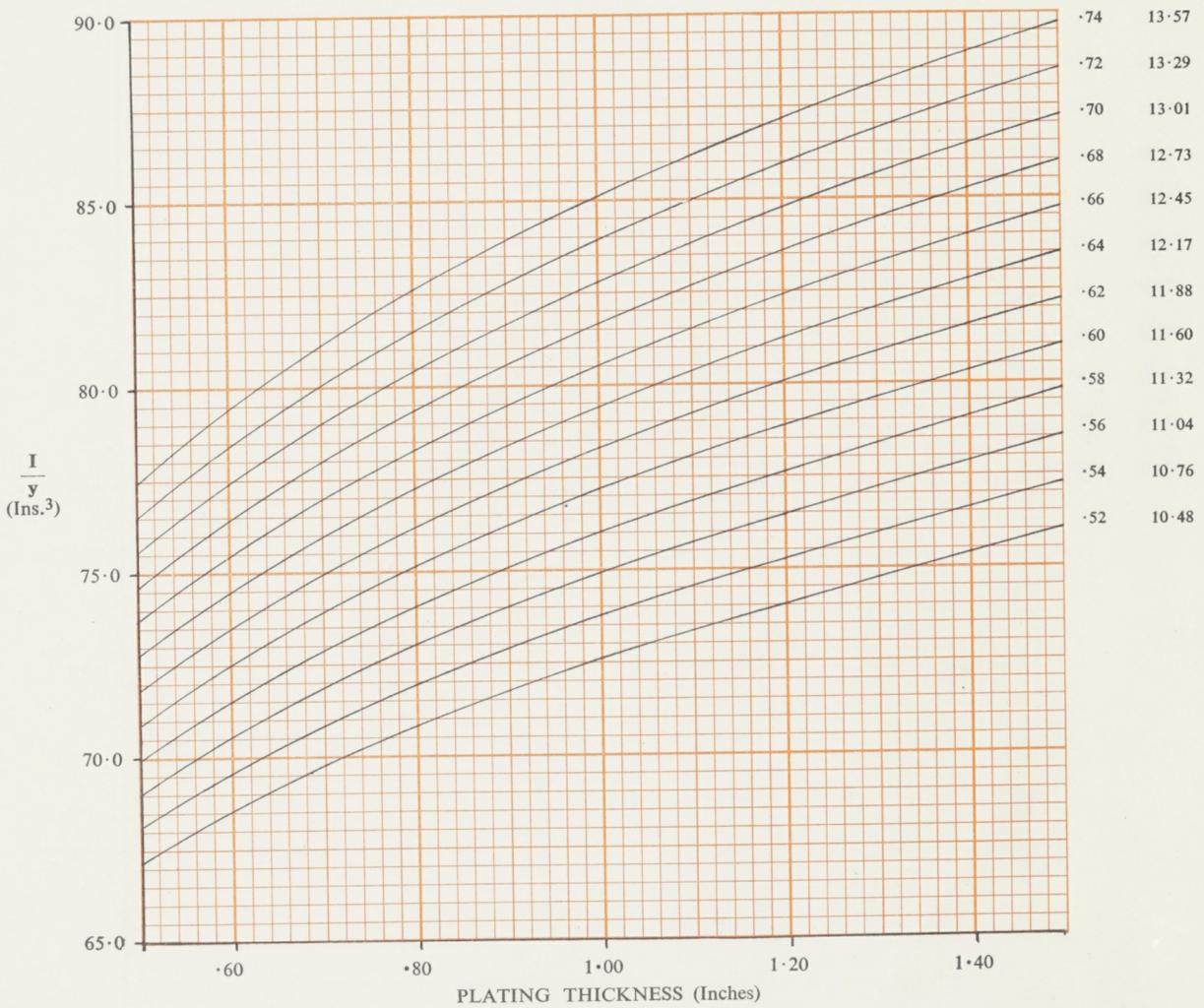


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



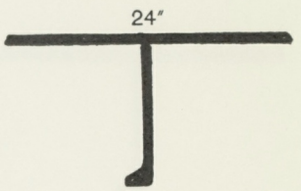
14″ DEPTH (cut from 15″)



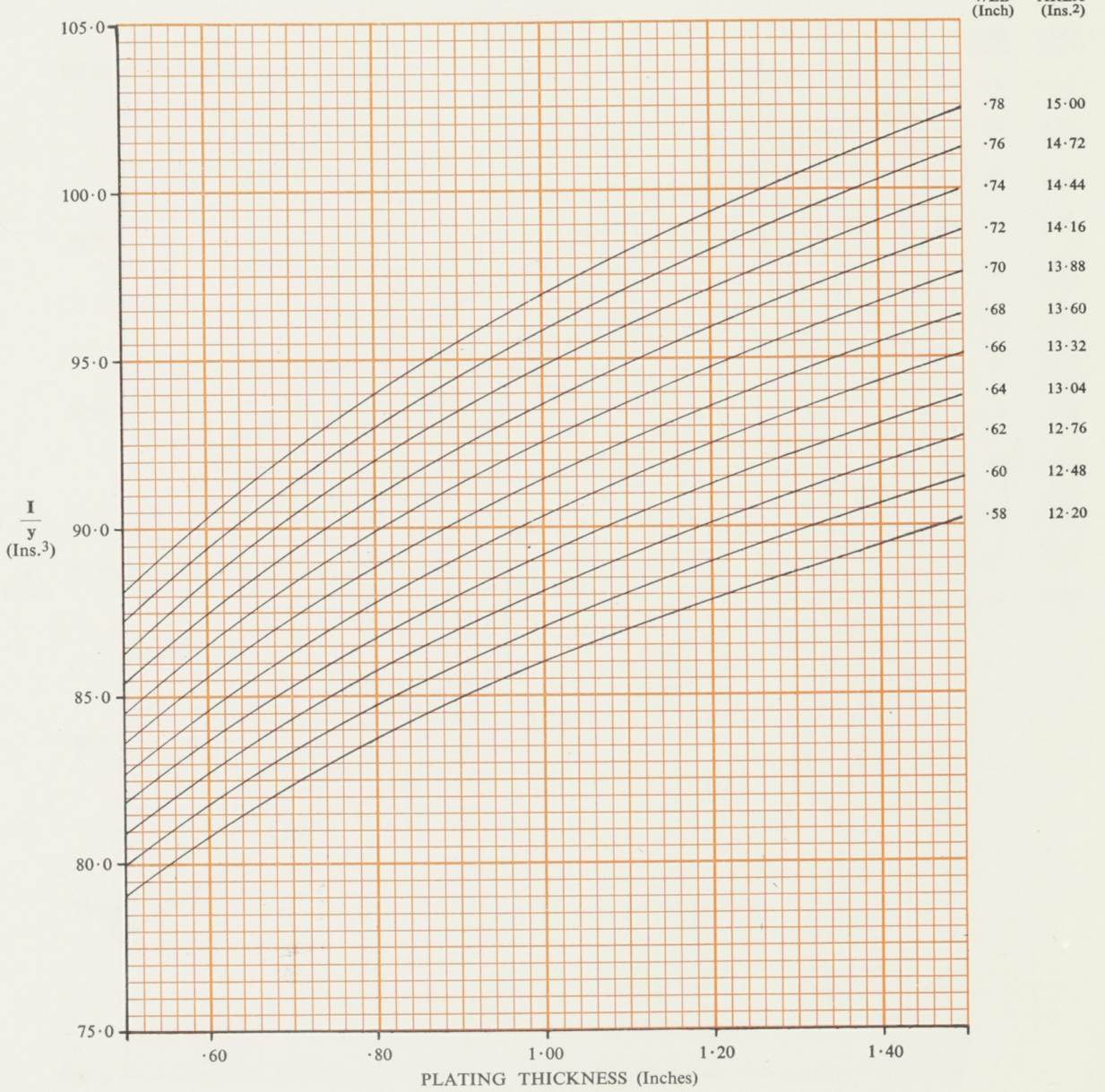
WEB (Inch)	AREA (Ins.2)
·74	13·57
·72	13·29
·70	13·01
·68	12·73
·66	12·45
·64	12·17
·62	11·88
·60	11·60
·58	11·32
·56	11·04
·54	10·76
·52	10·48

SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

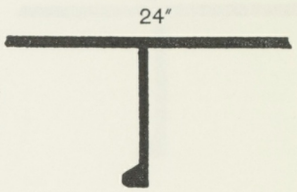


14″ DEPTH (cut from 17″)



SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



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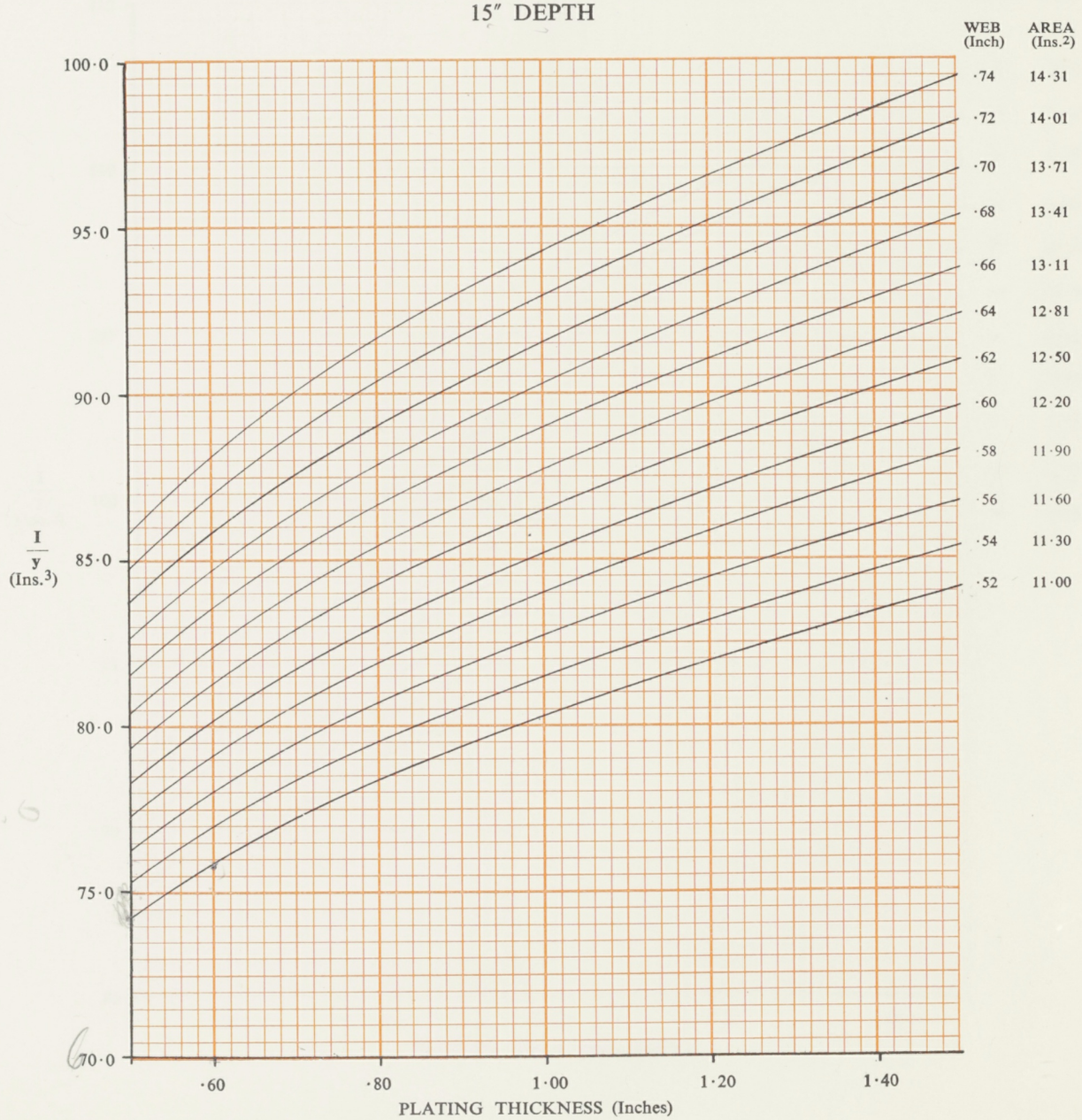

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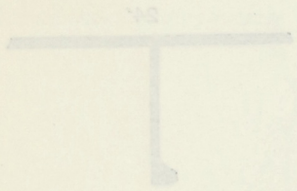
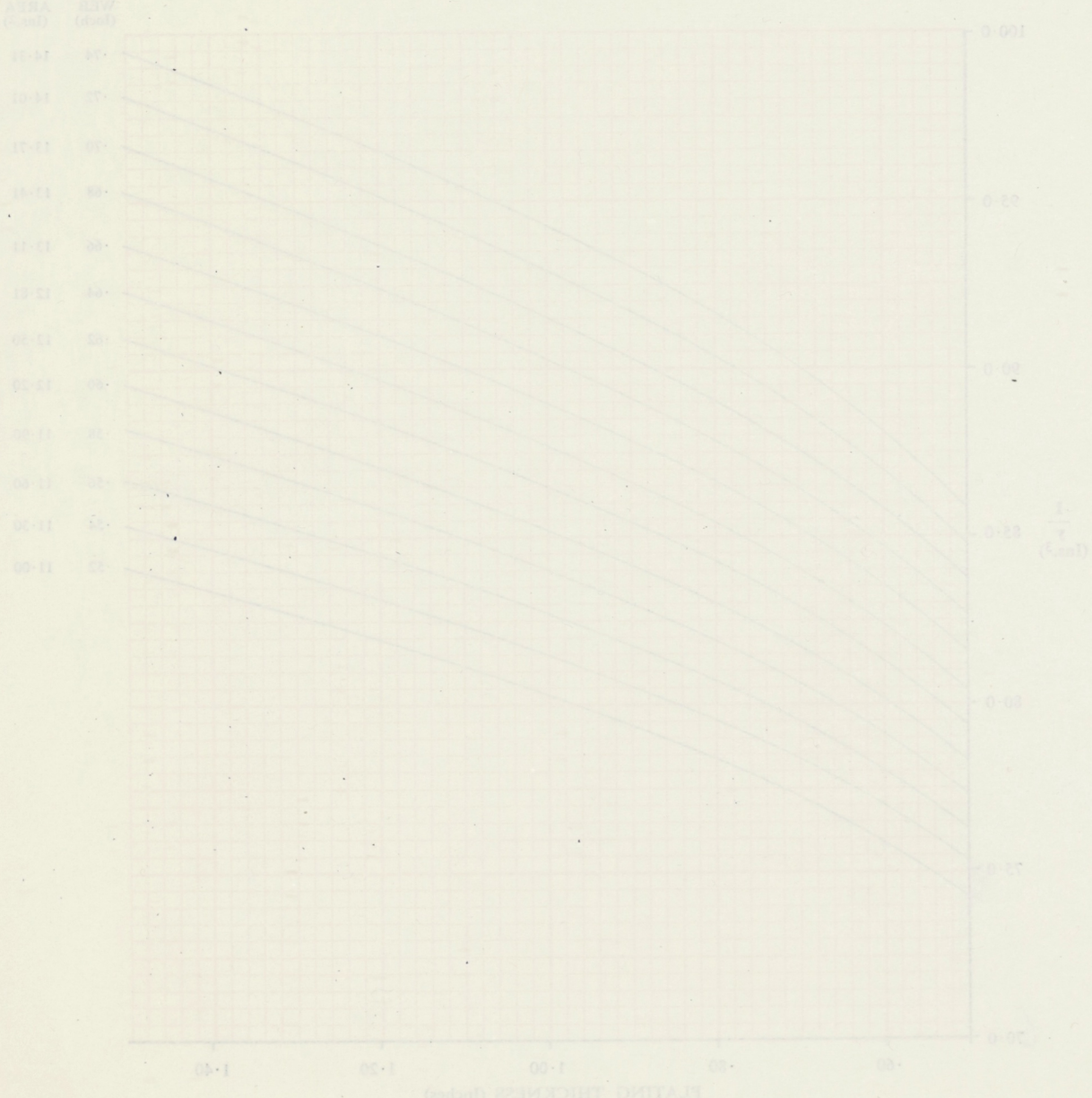
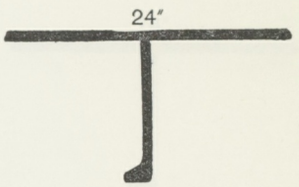


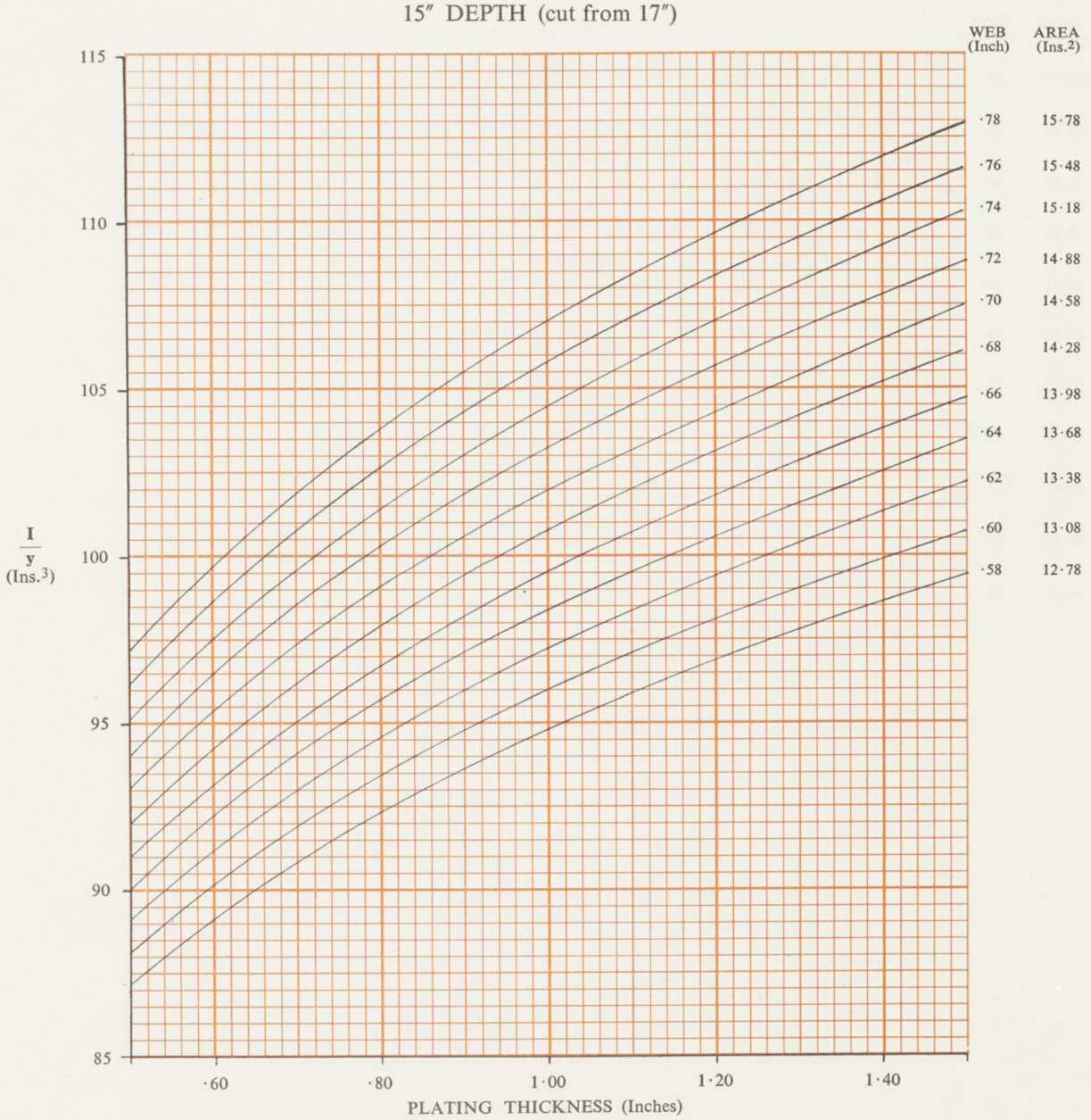


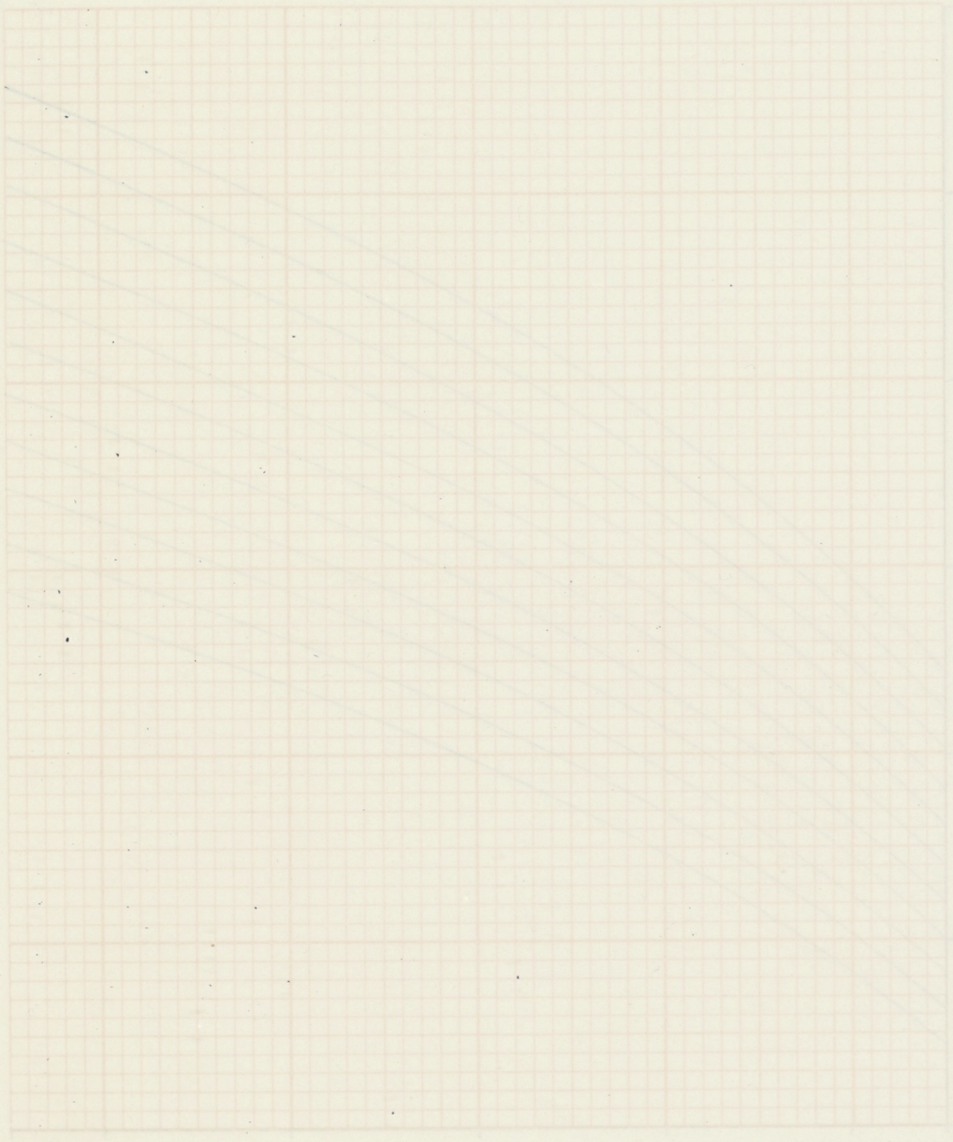
SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



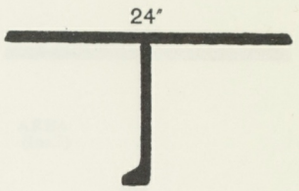
15″ DEPTH (cut from 17″)



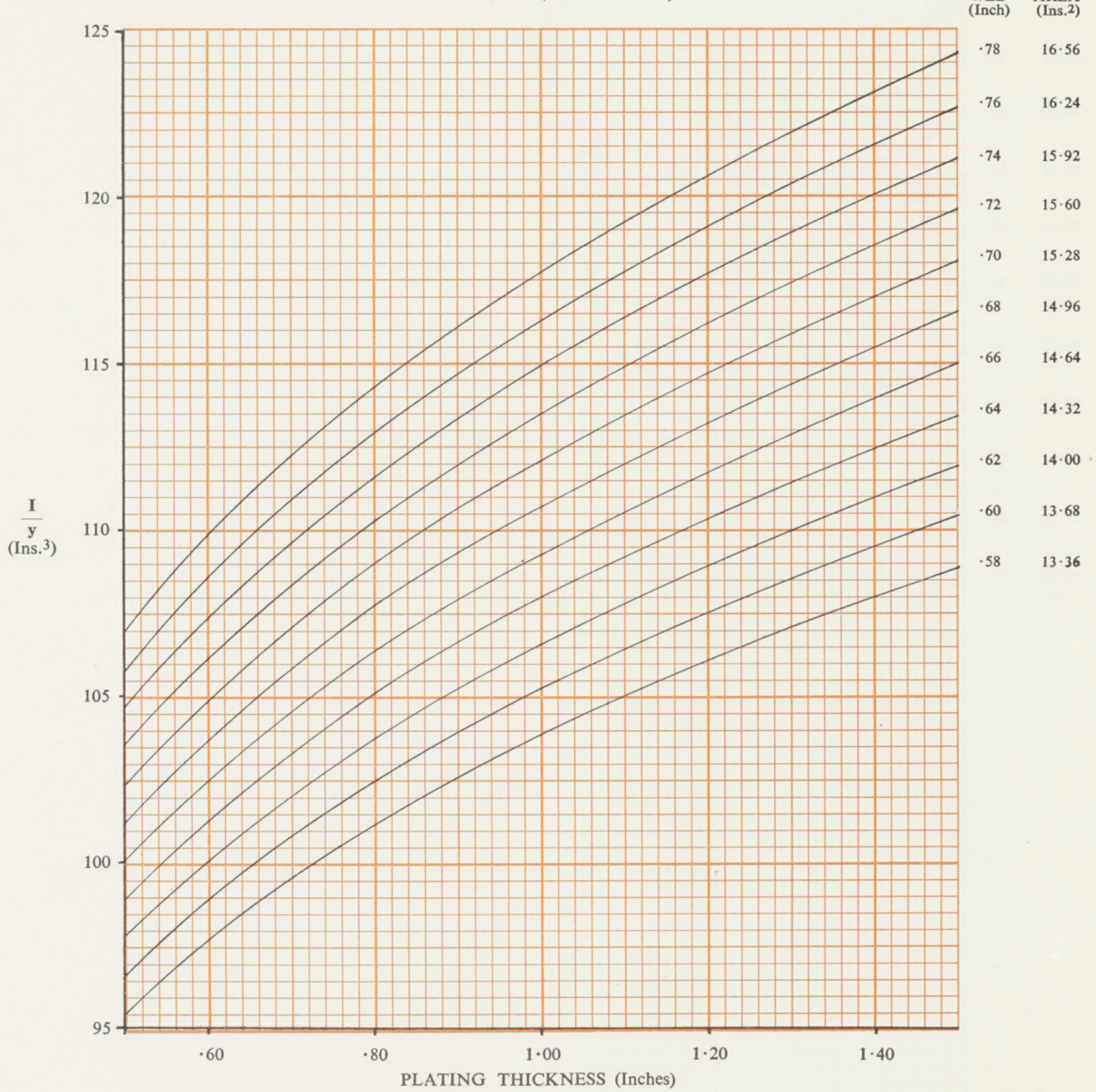


SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES

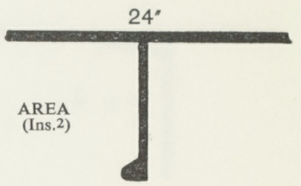
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



16″ DEPTH (cut from 17″)



SECTION MODULUS AND AREA OF ONE-SIDED BULB PLATES



(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

17″ DEPTH

WEB (Inch)	AREA (Ins.2)
·78	17·34
·76	17·00
·74	16·66
·72	16·32
·70	15·98
·68	15·64
·66	15·30
·64	14·96
·62	14·62
·60	14·28
·58	13·94

$\frac{I}{y}$ (Ins.^{3})

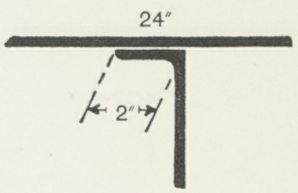
140
135
130
125
120
115
110
105
100

·60 ·80 1·00 1·20 1·40

PLATING THICKNESS (Inches)

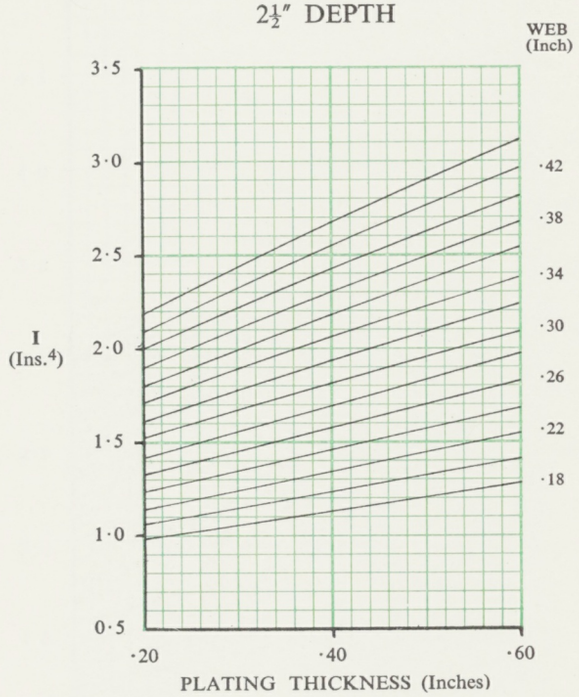
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

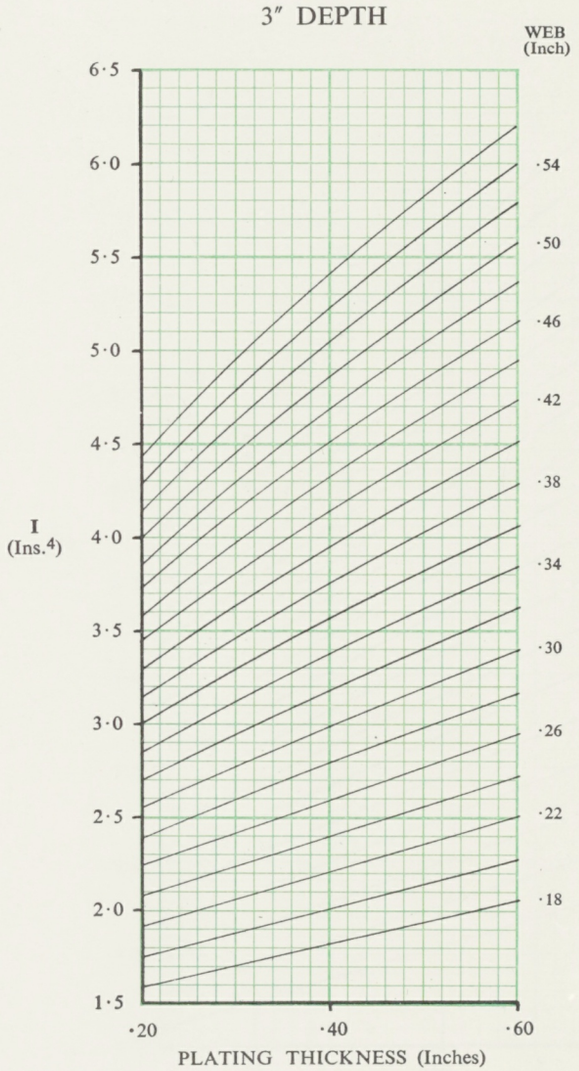


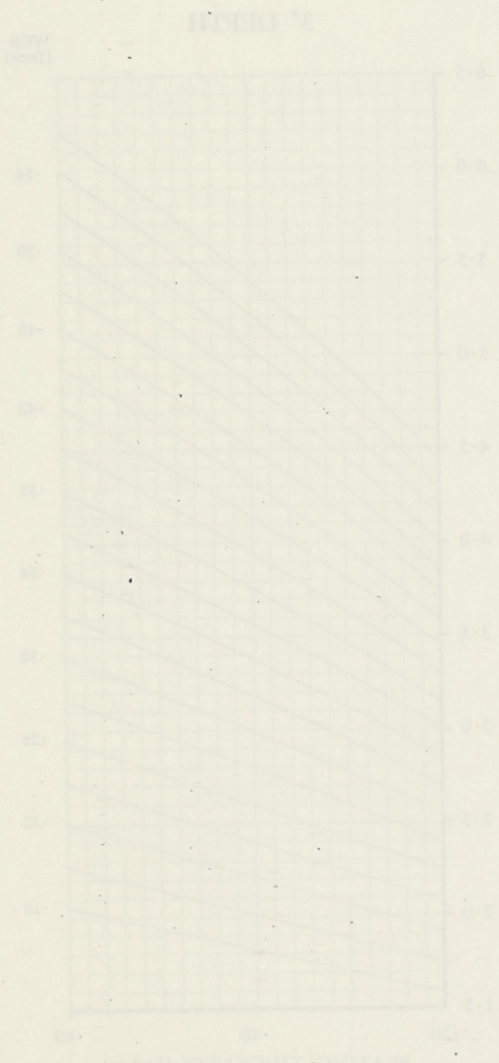
2″ FLANGE

2½″ DEPTH



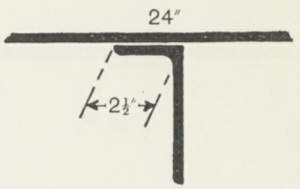
3″ DEPTH





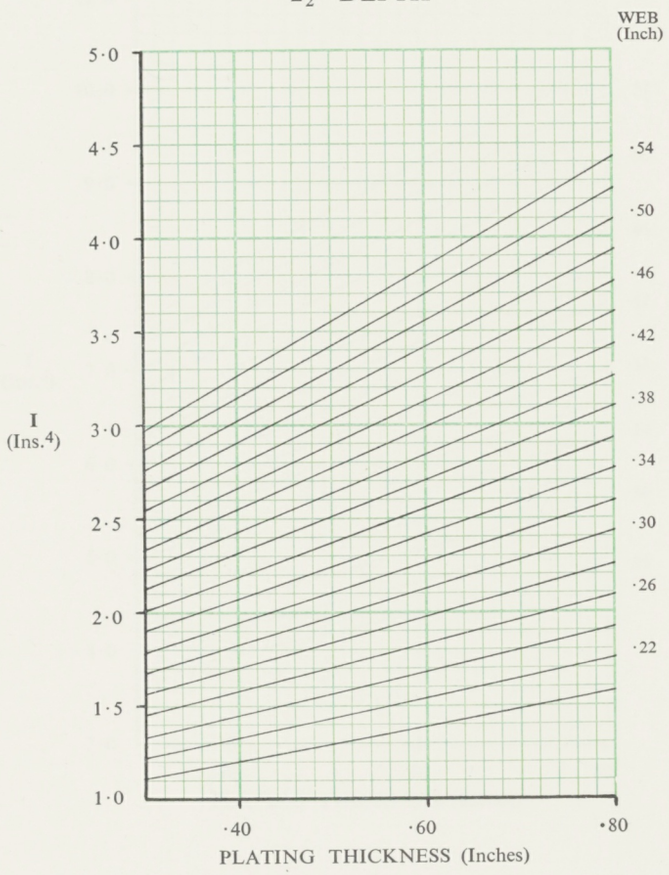
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

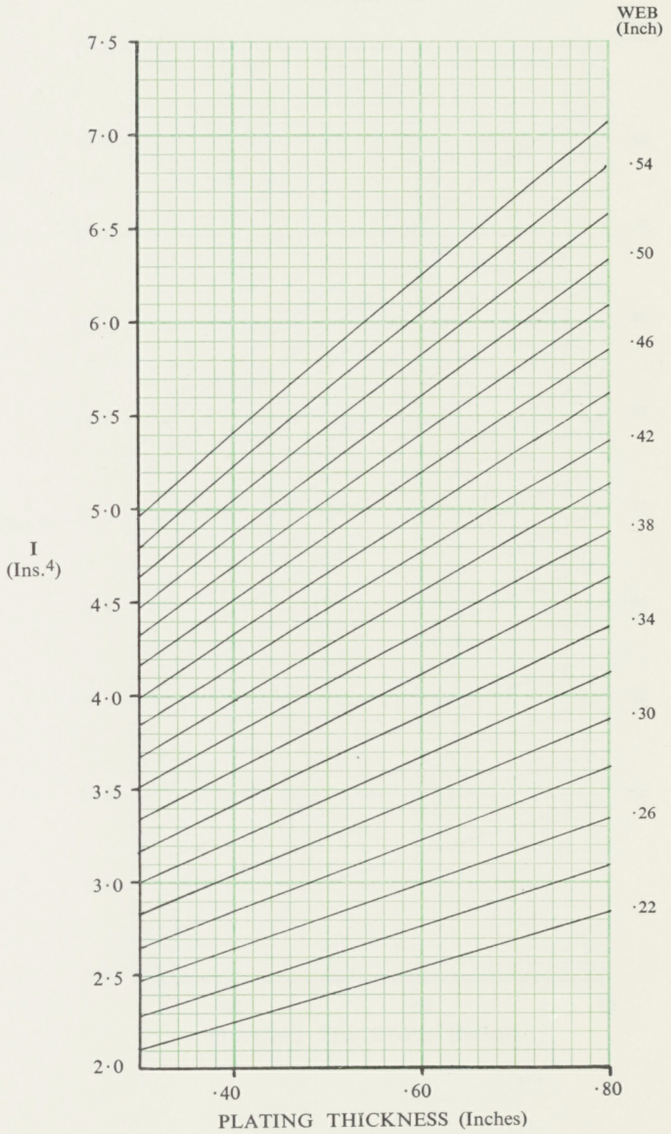


2½″ FLANGE

2½″ DEPTH

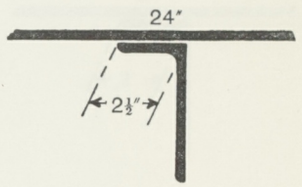


3″ DEPTH



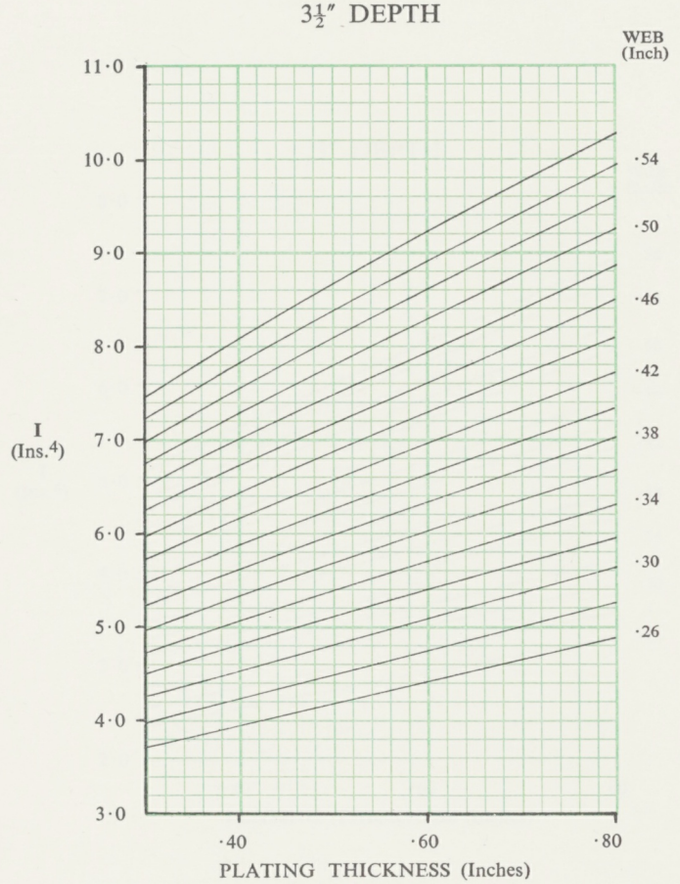
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

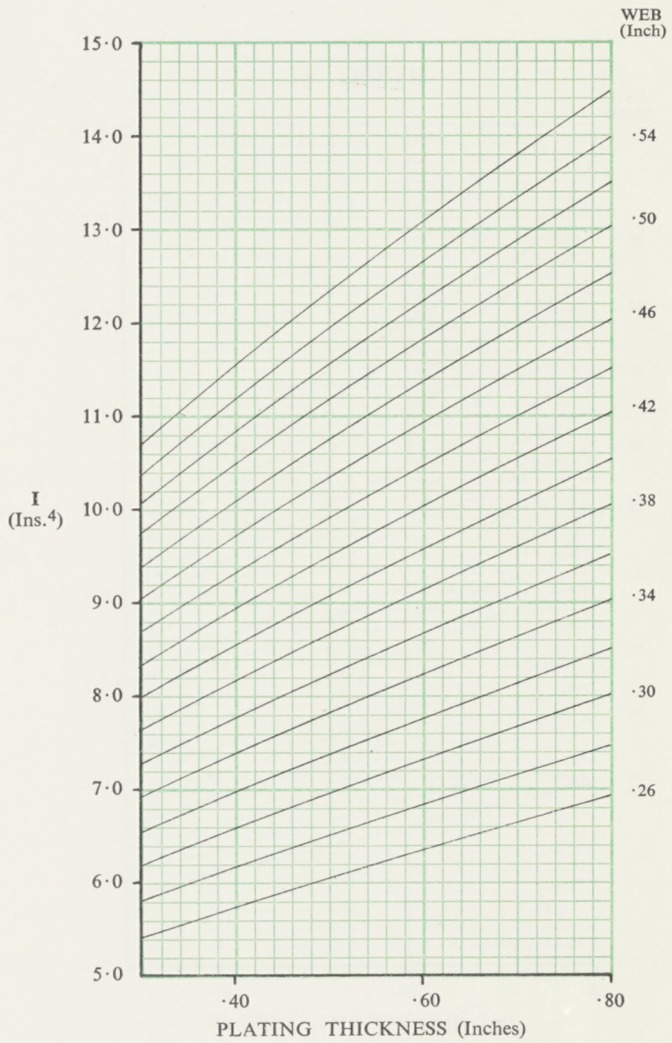


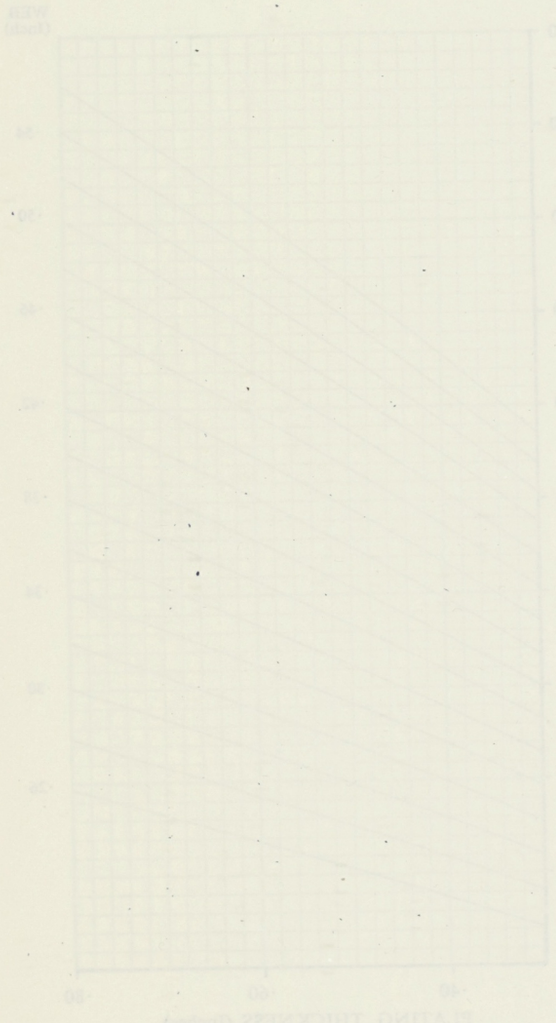
2½″ FLANGE

3½″ DEPTH



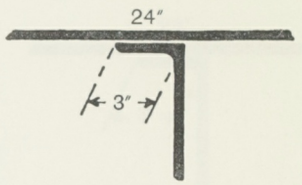
4″ DEPTH





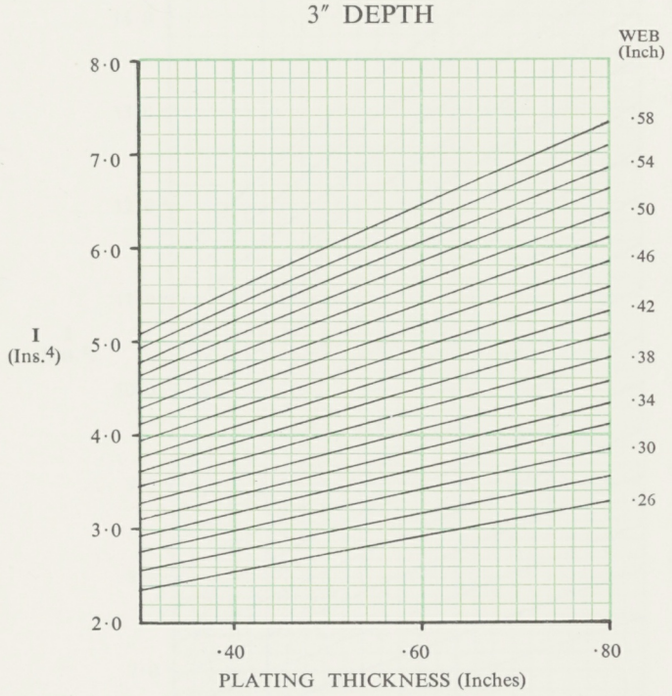
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

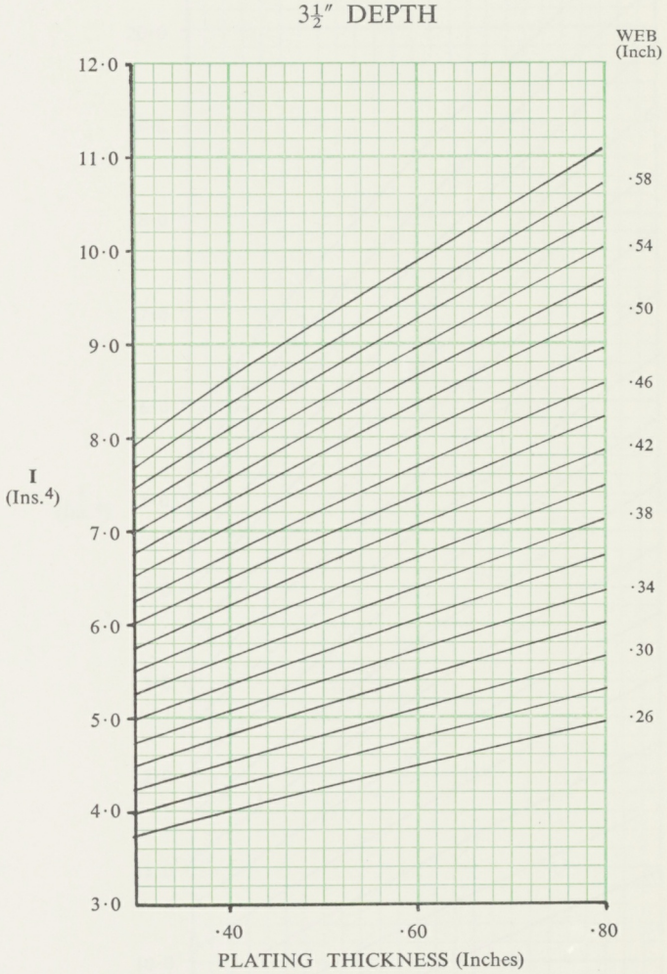


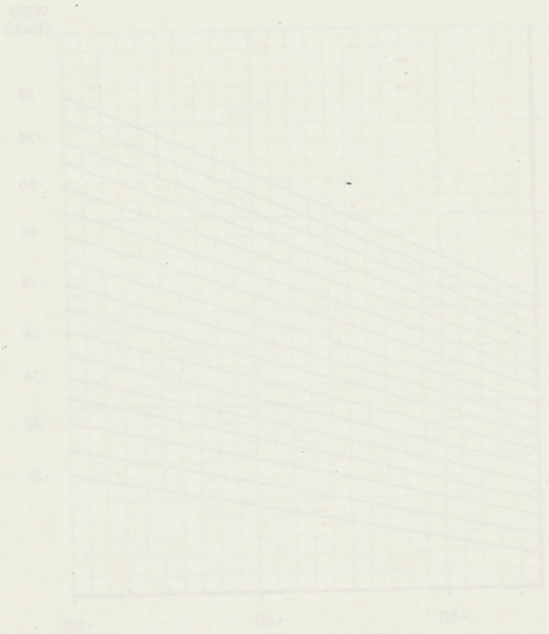
3″ FLANGE

3″ DEPTH



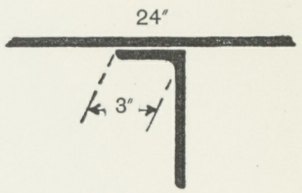
3½″ DEPTH





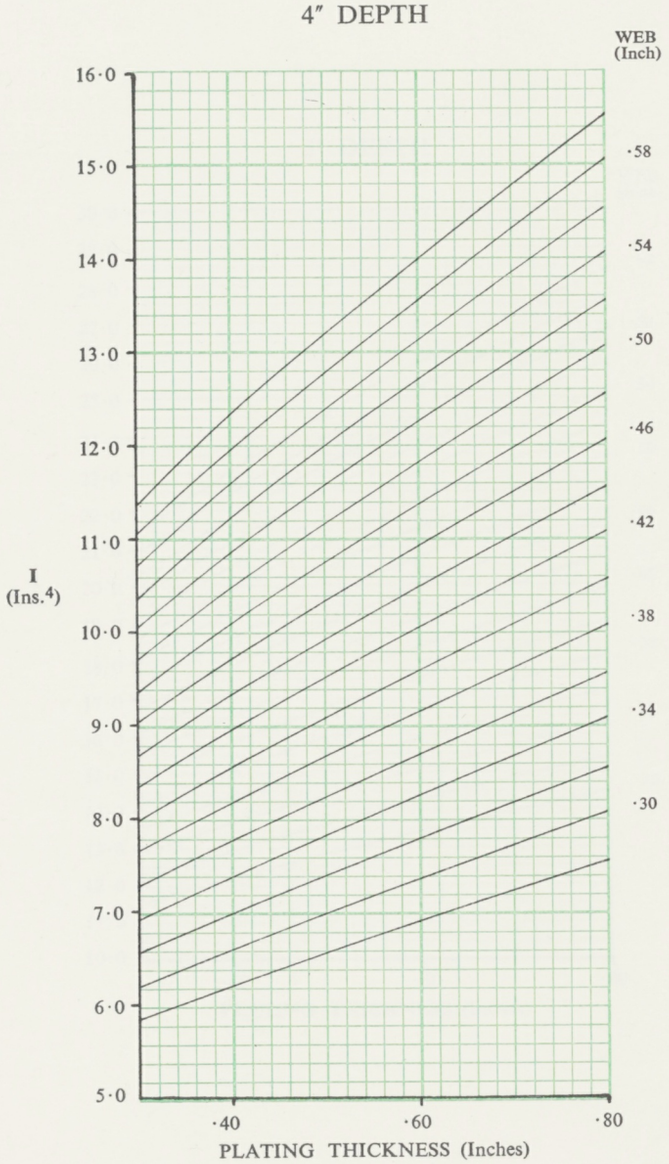
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

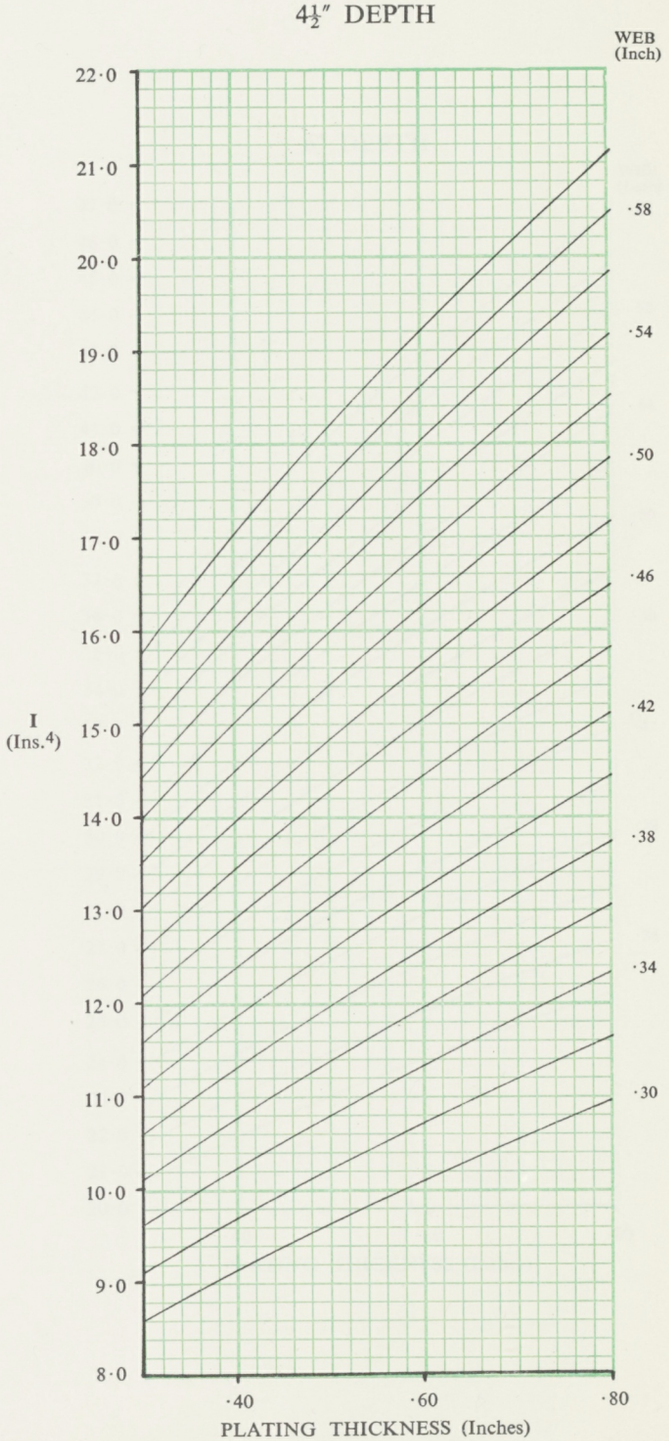


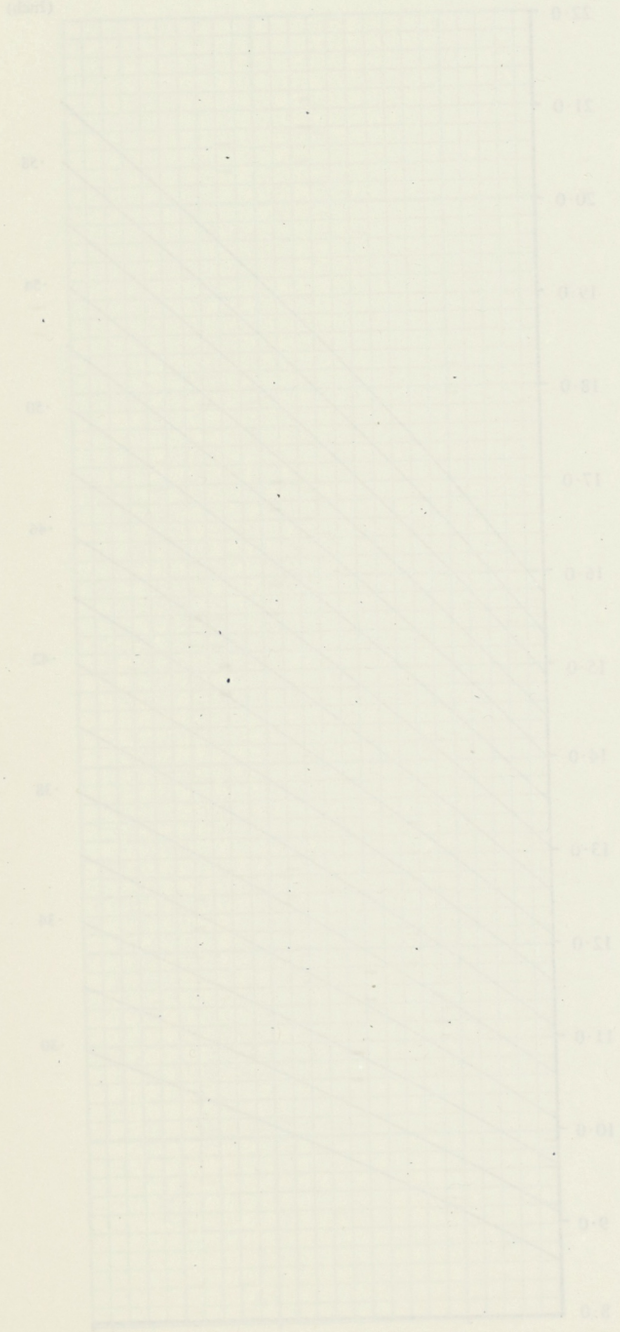
3″ FLANGE

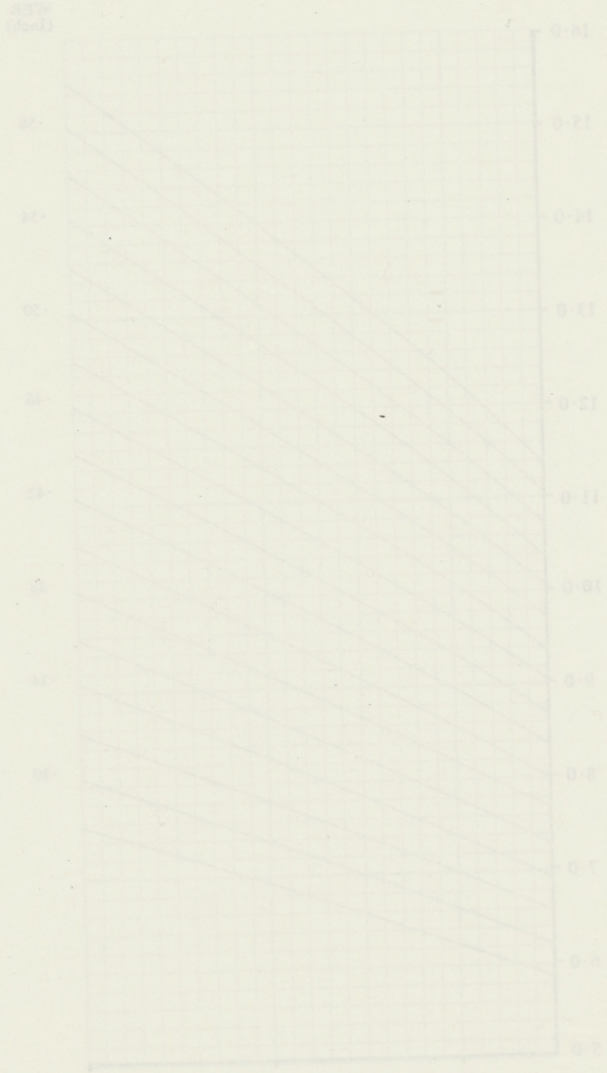
4″ DEPTH



4½″ DEPTH

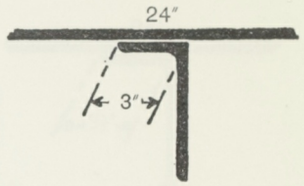






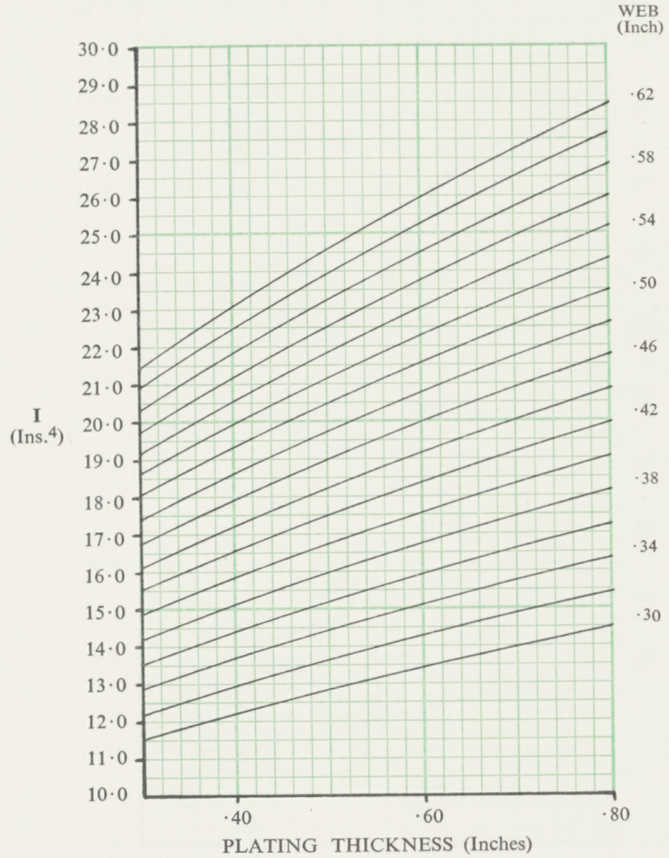
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

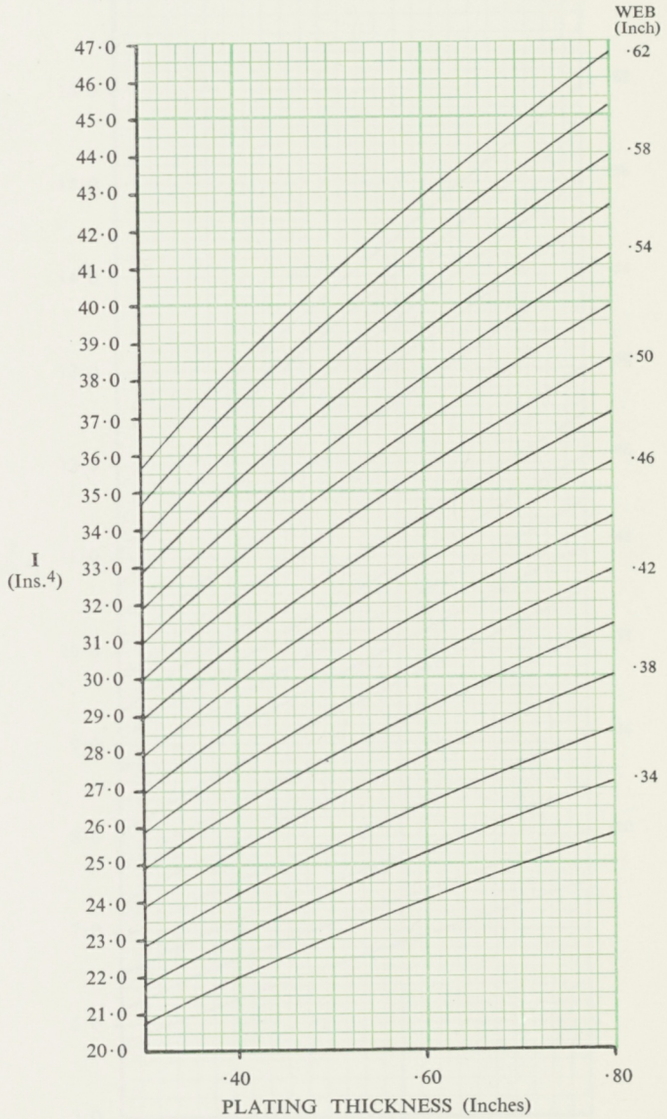


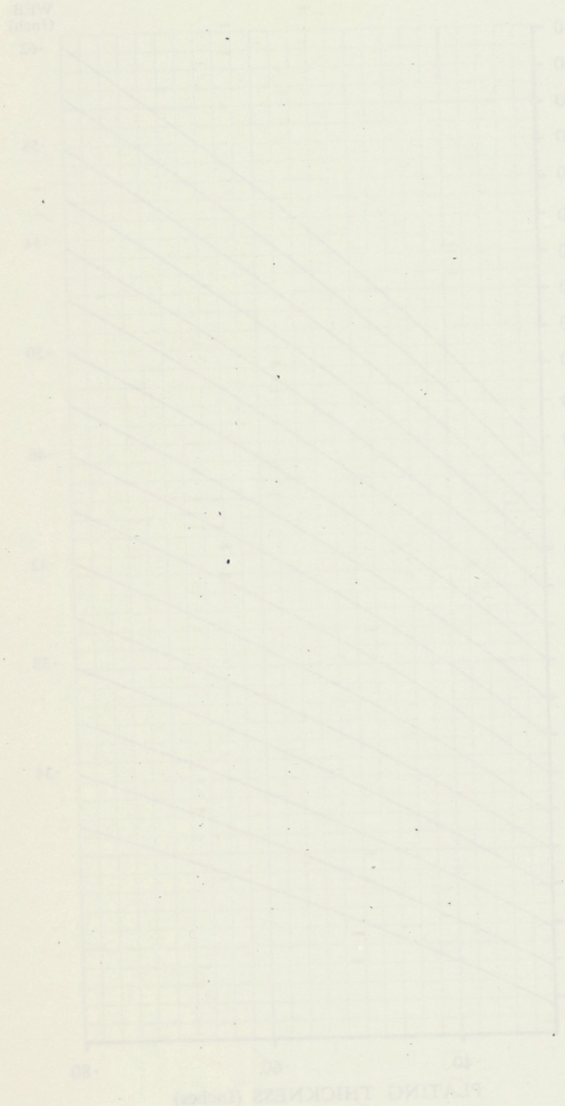
3″ FLANGE

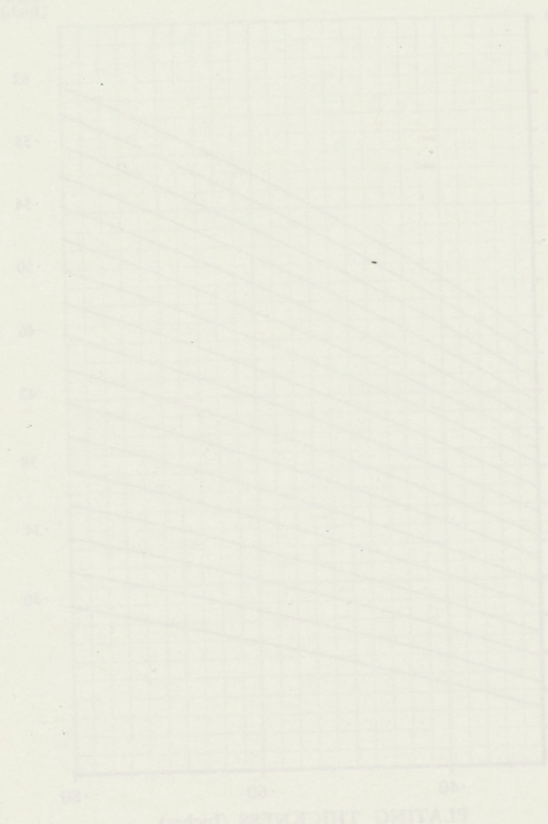
5″ DEPTH



6″ DEPTH

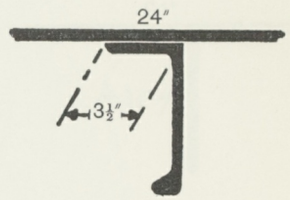






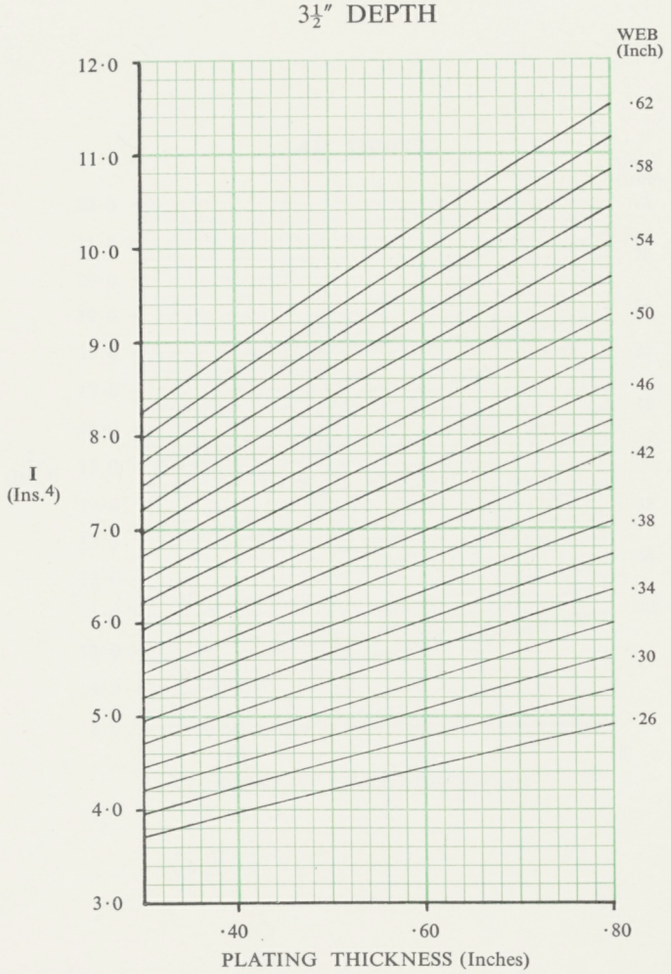
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

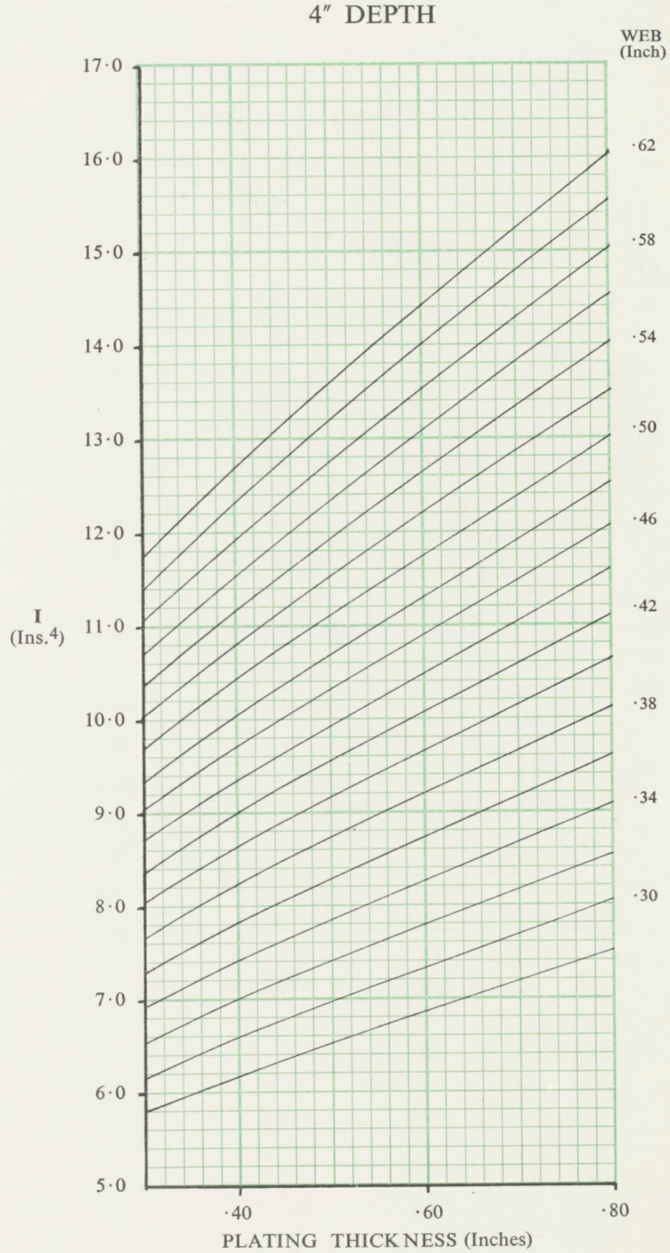


3½″ FLANGE

3½″ DEPTH

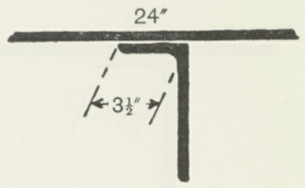


4″ DEPTH



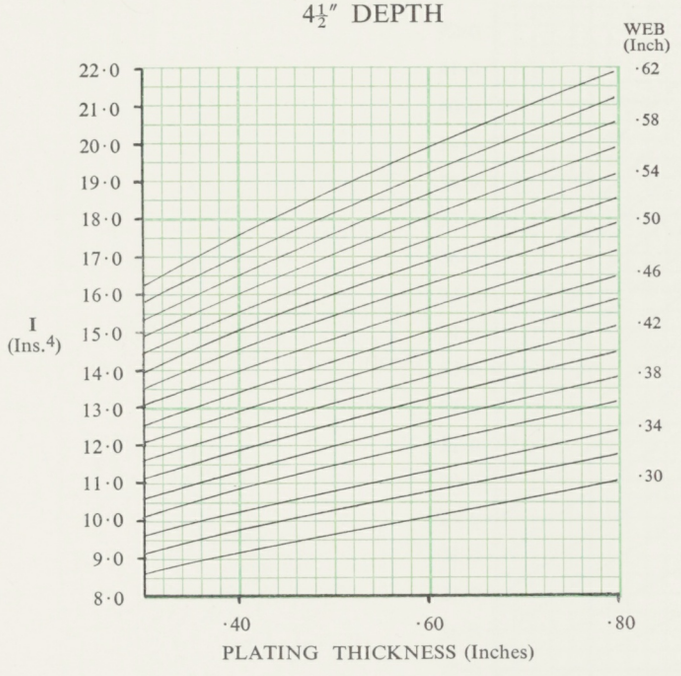
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

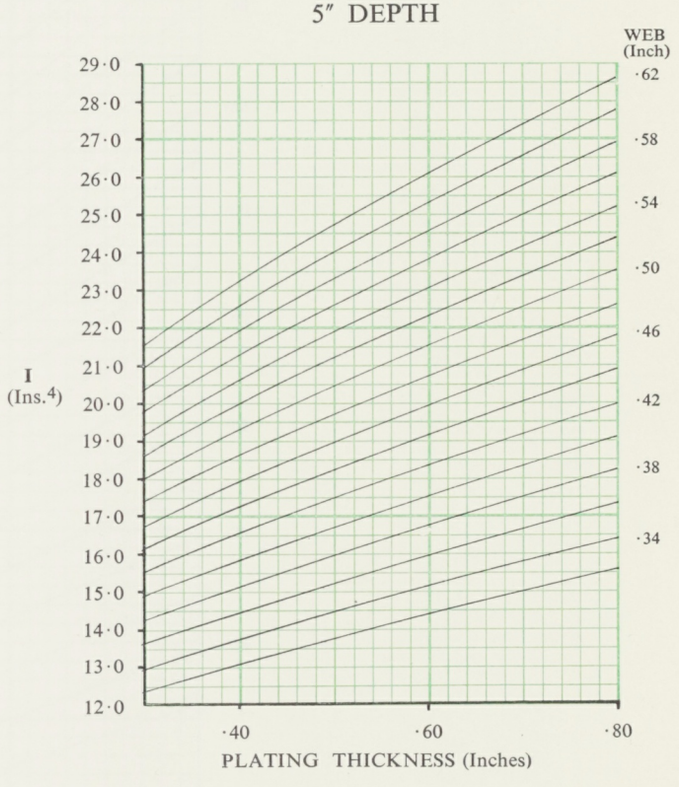


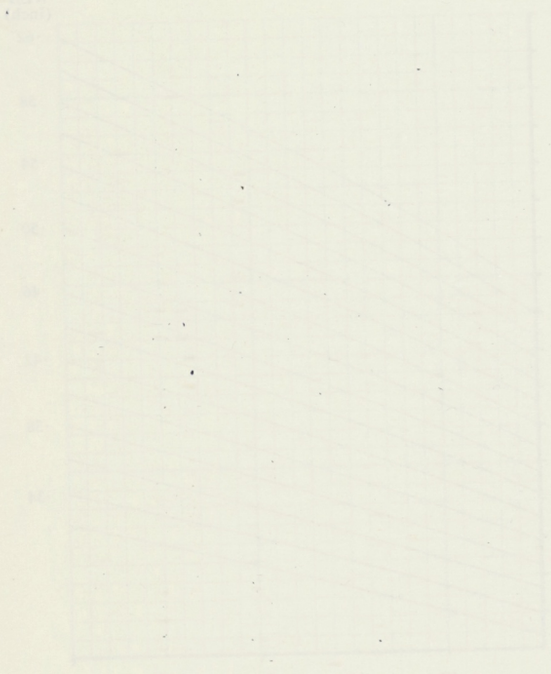
3½″ FLANGE

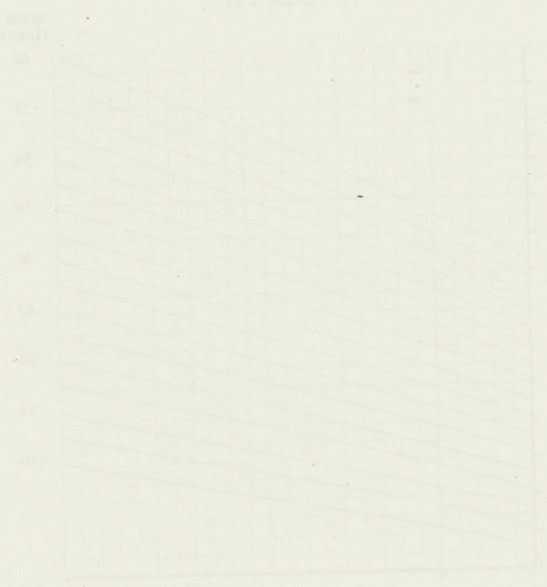
4½″ DEPTH



5″ DEPTH

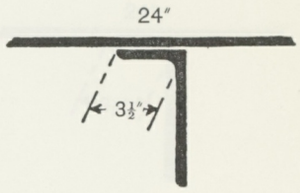




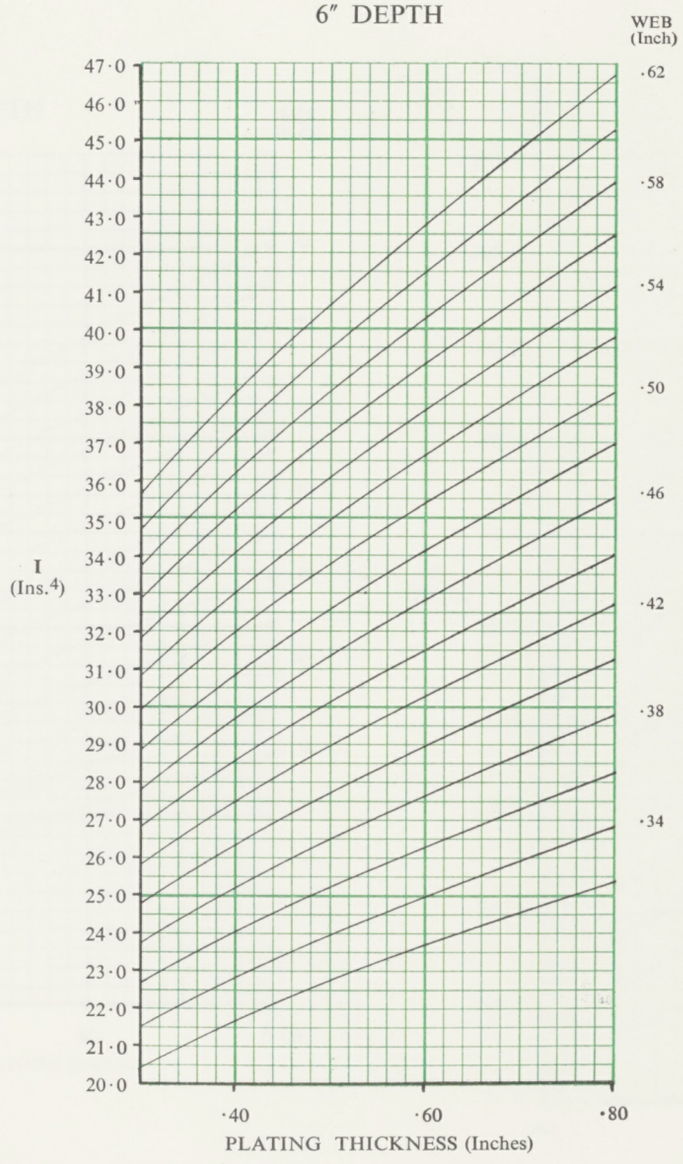


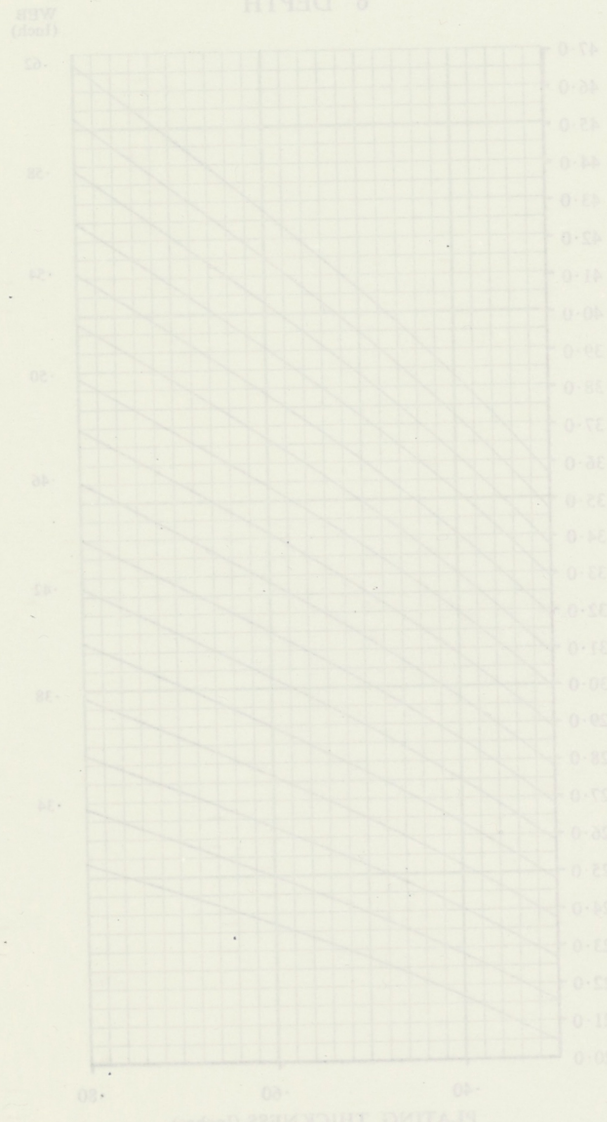
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)



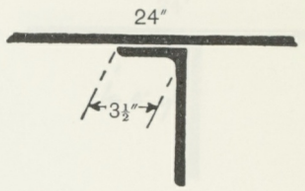
3½″ FLANGE





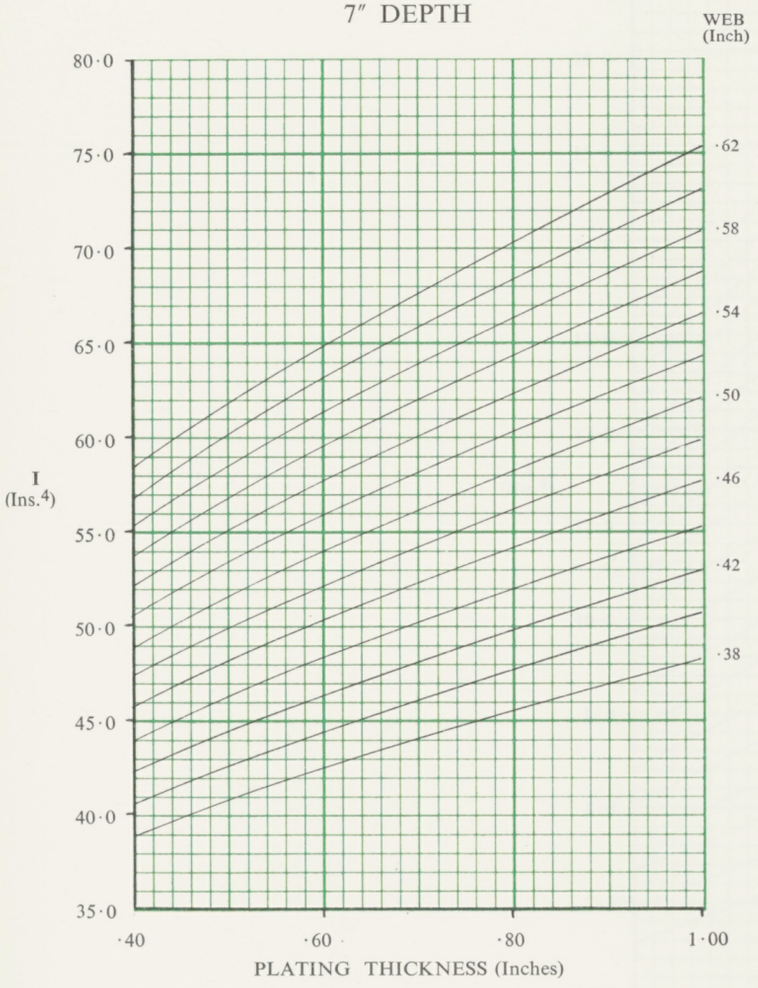
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

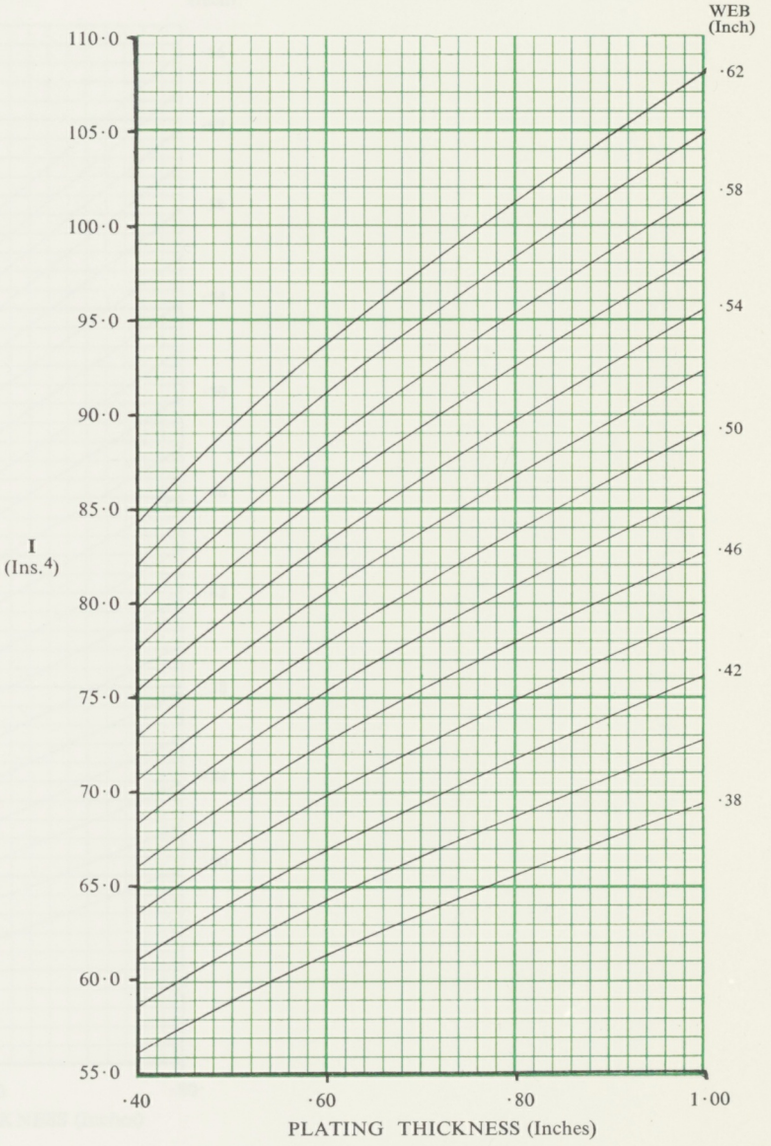


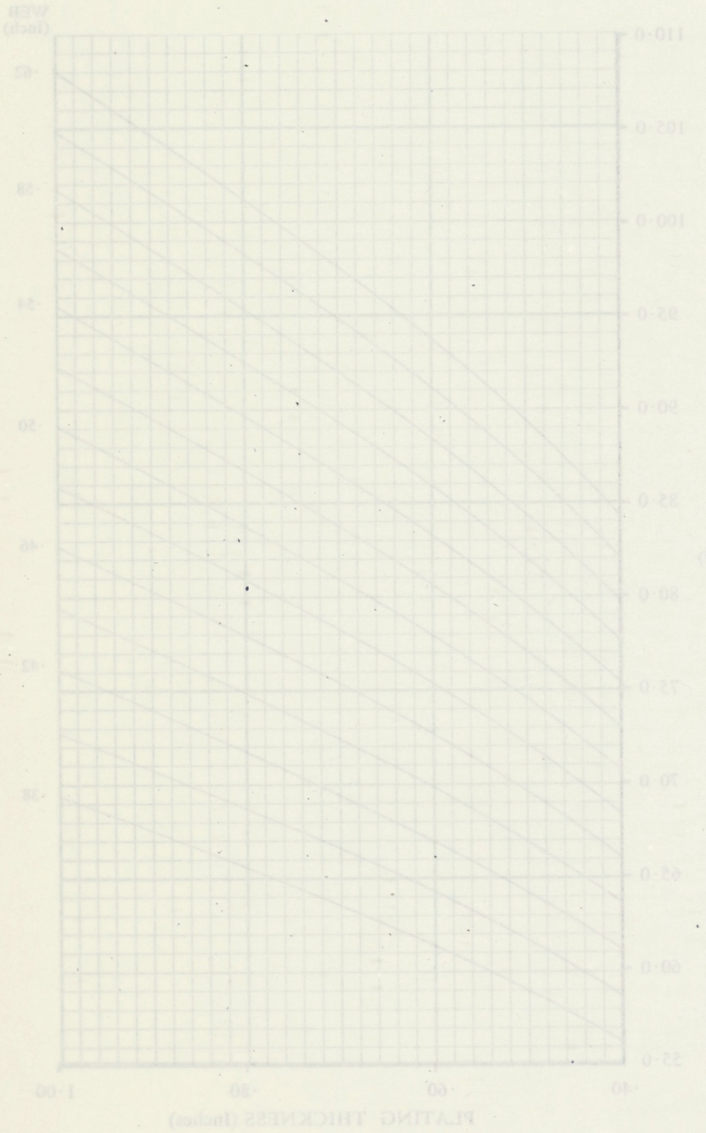
3½″ FLANGE

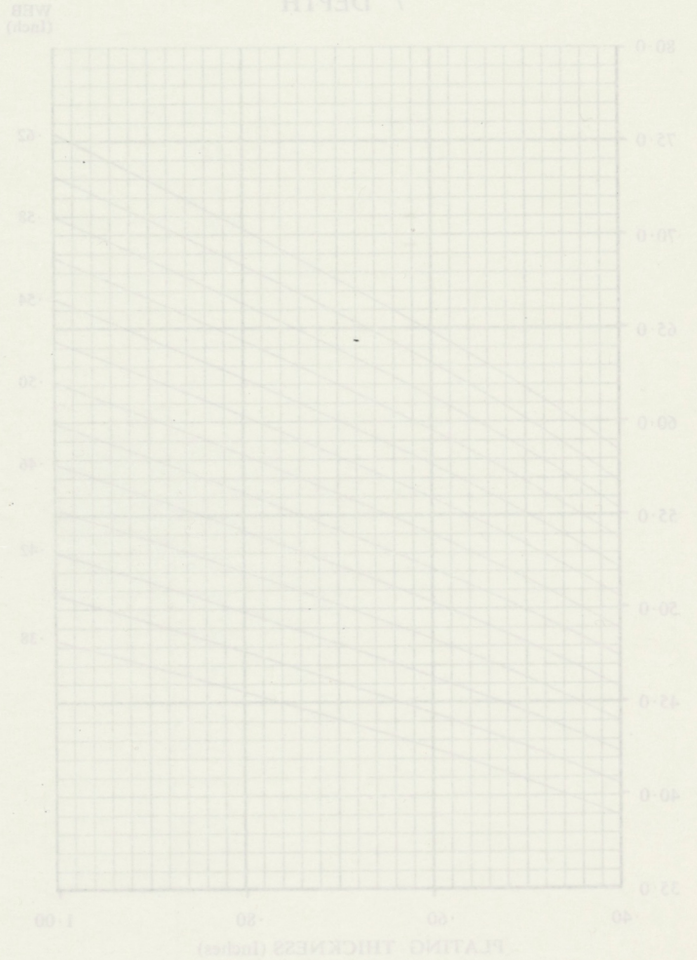
7″ DEPTH



8″ DEPTH

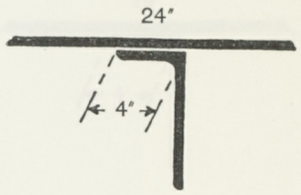




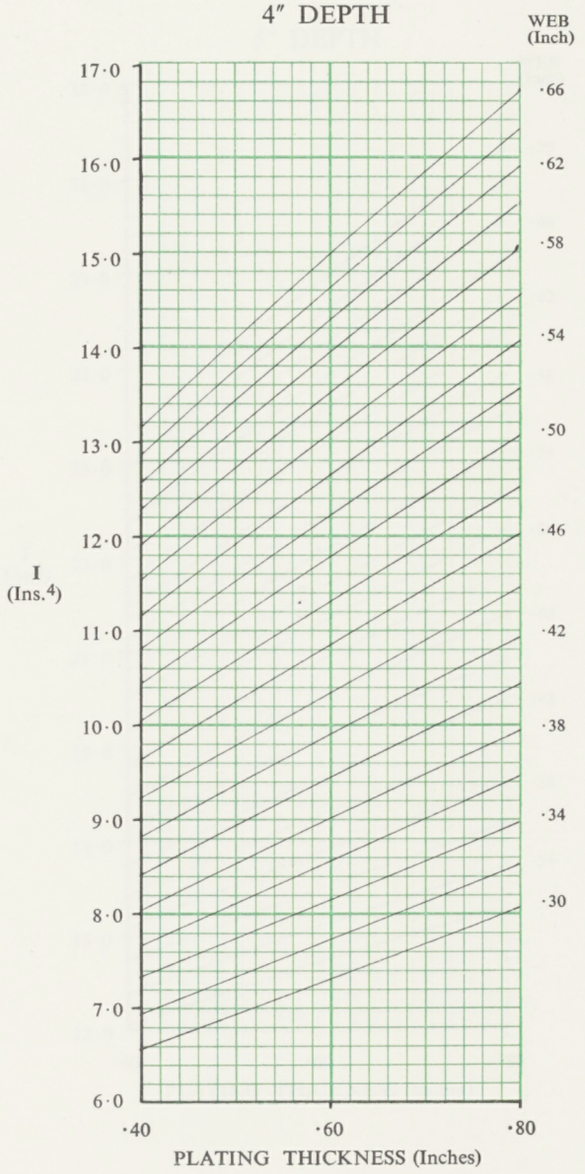


MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

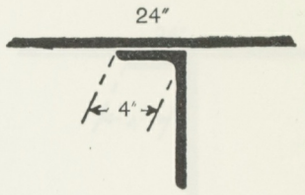


4″ FLANGE



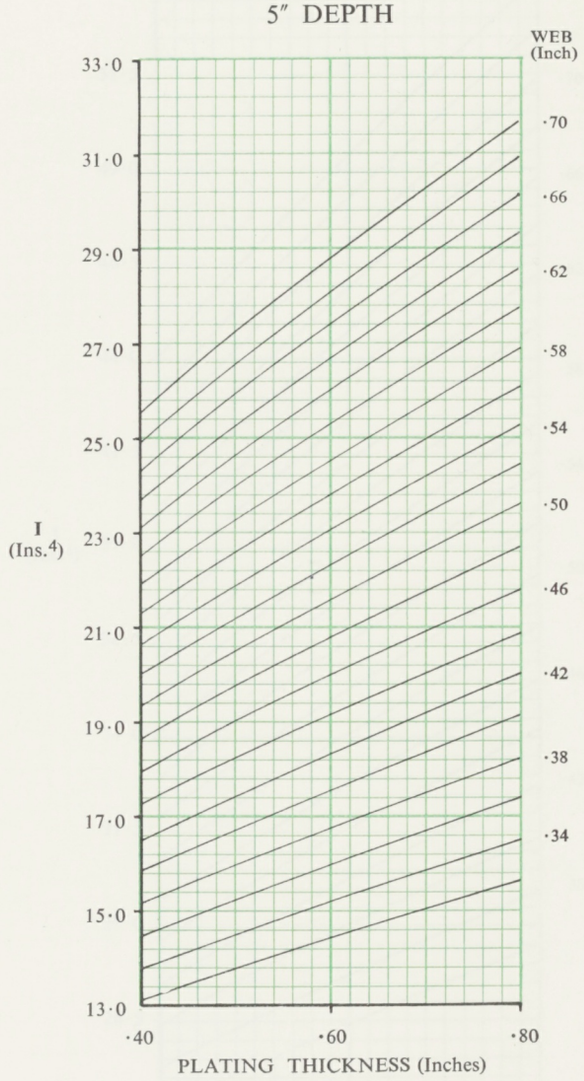
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)



4″ FLANGE

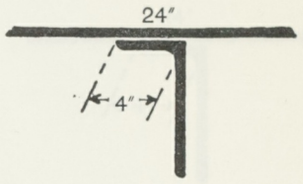
5″ DEPTH



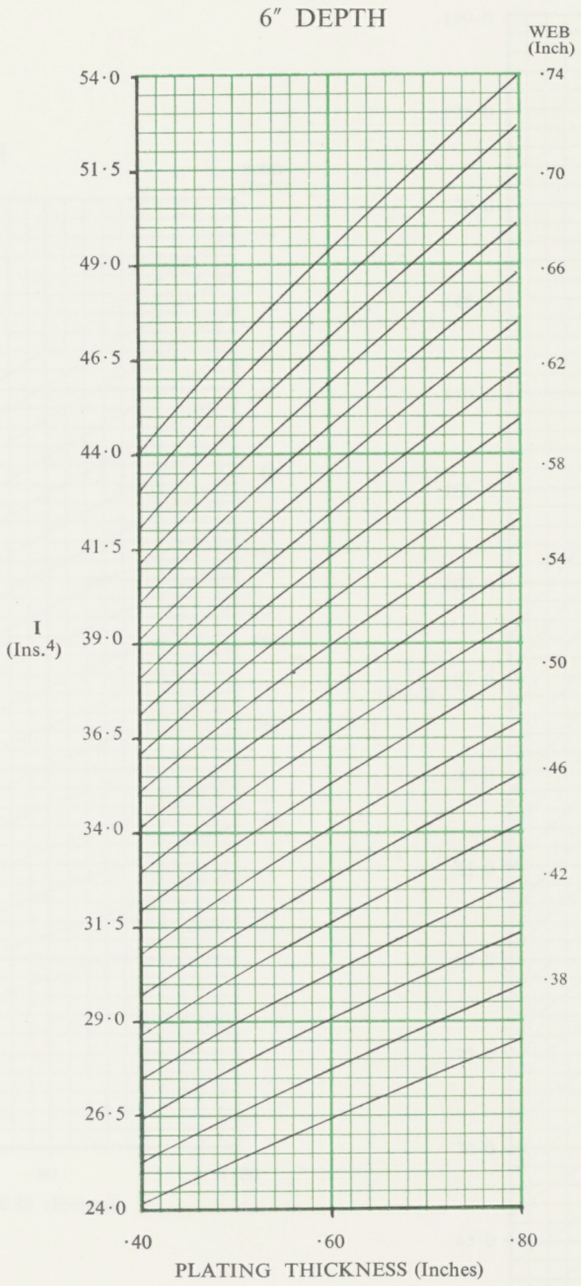
24"
4"
4"

MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

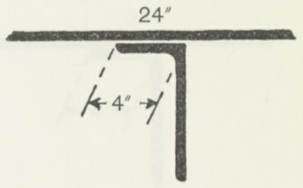


4″ FLANGE



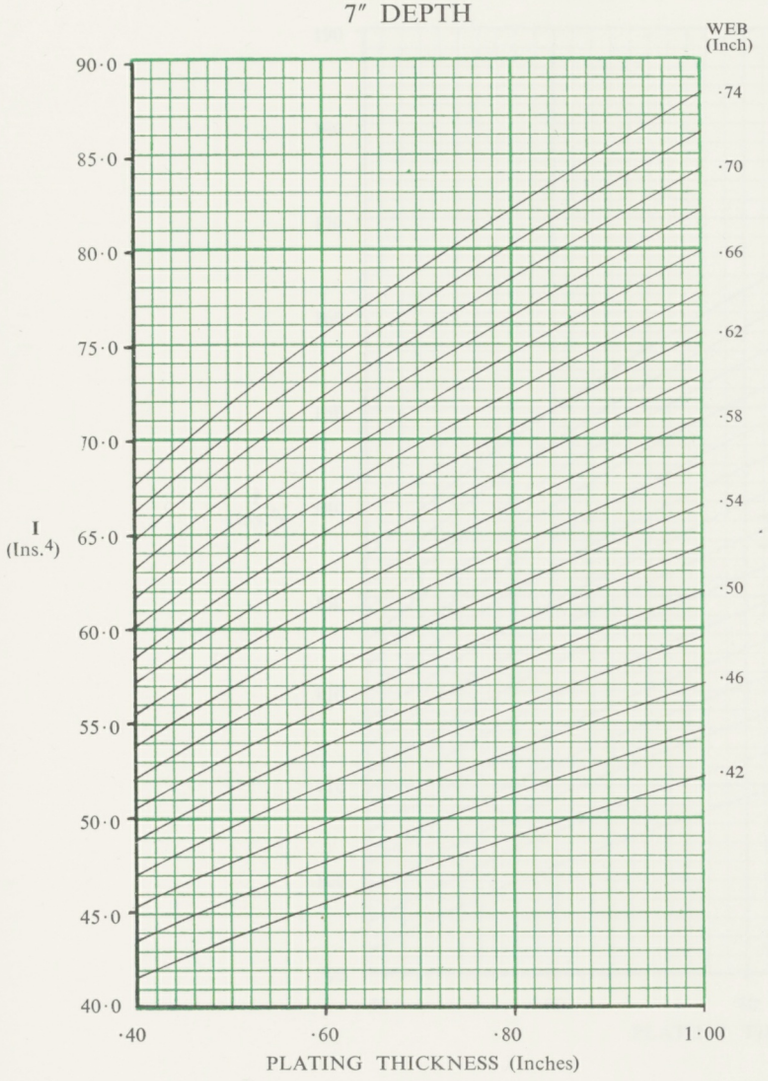
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)

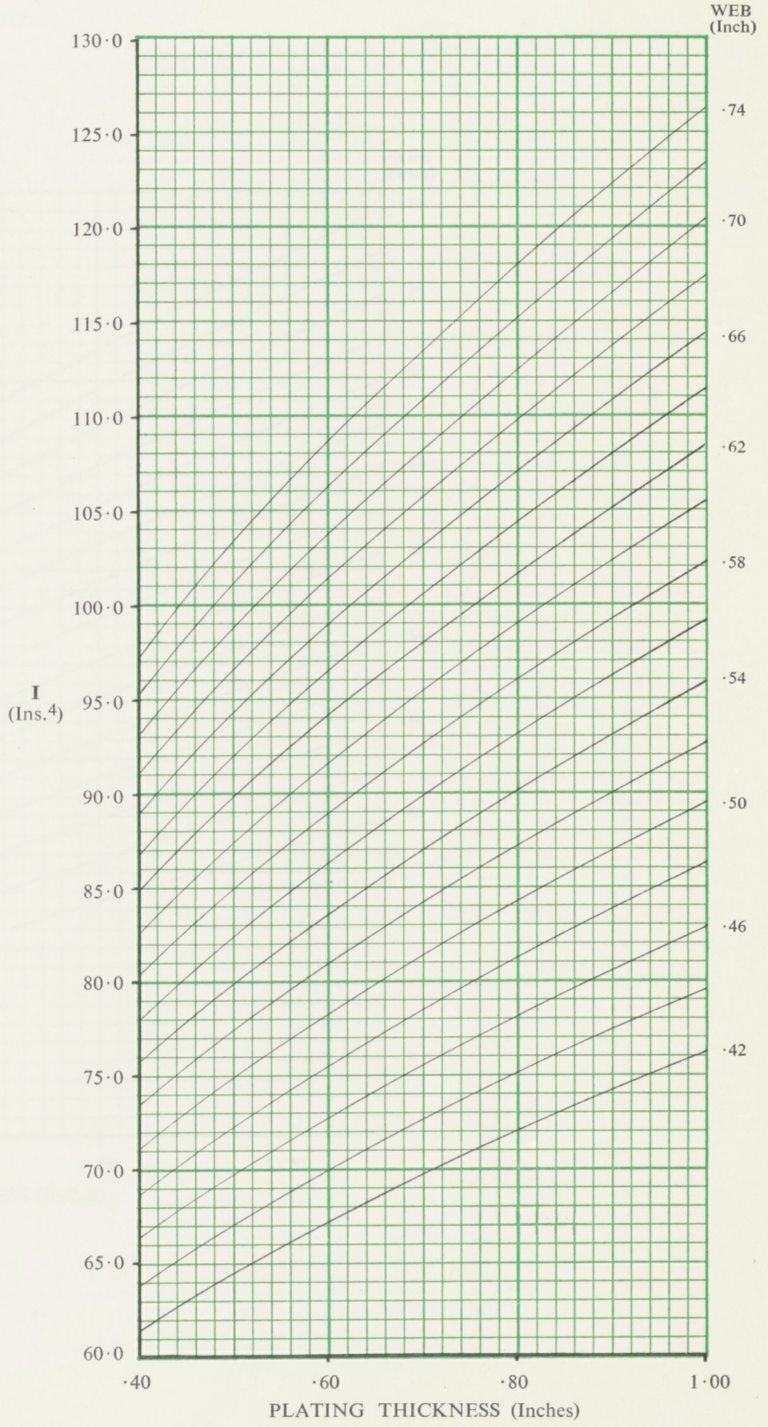


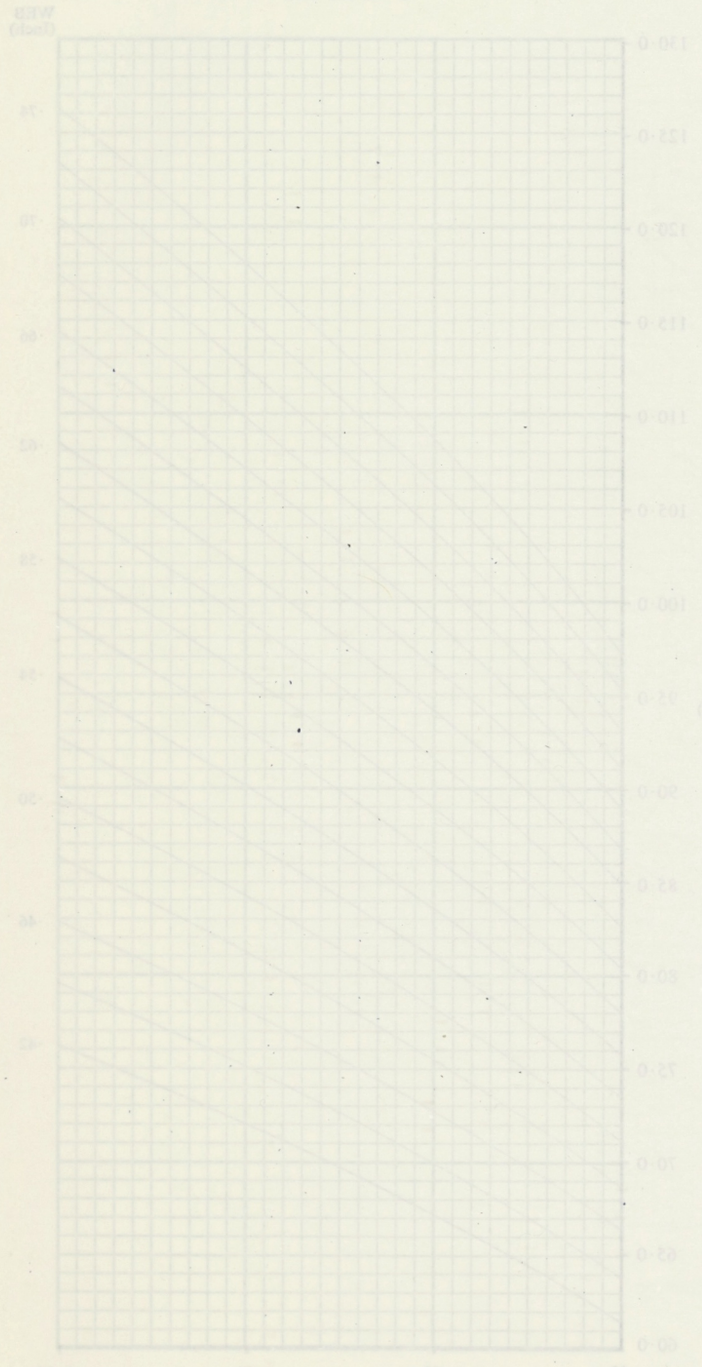
4″ FLANGE

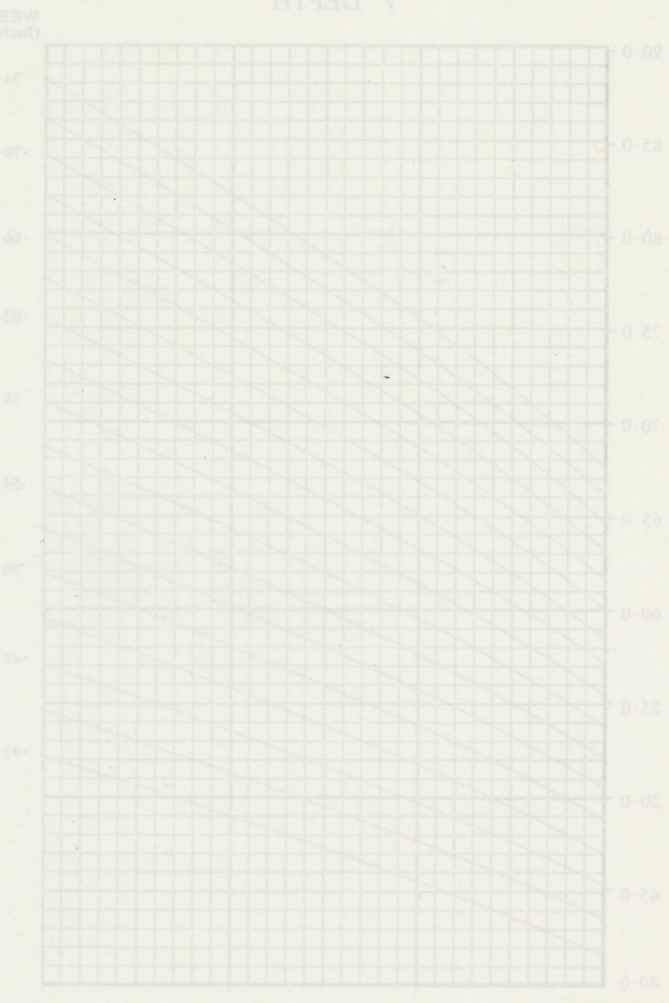
7″ DEPTH



8″ DEPTH

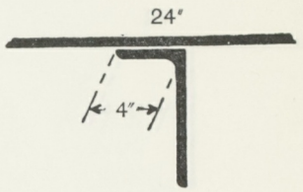




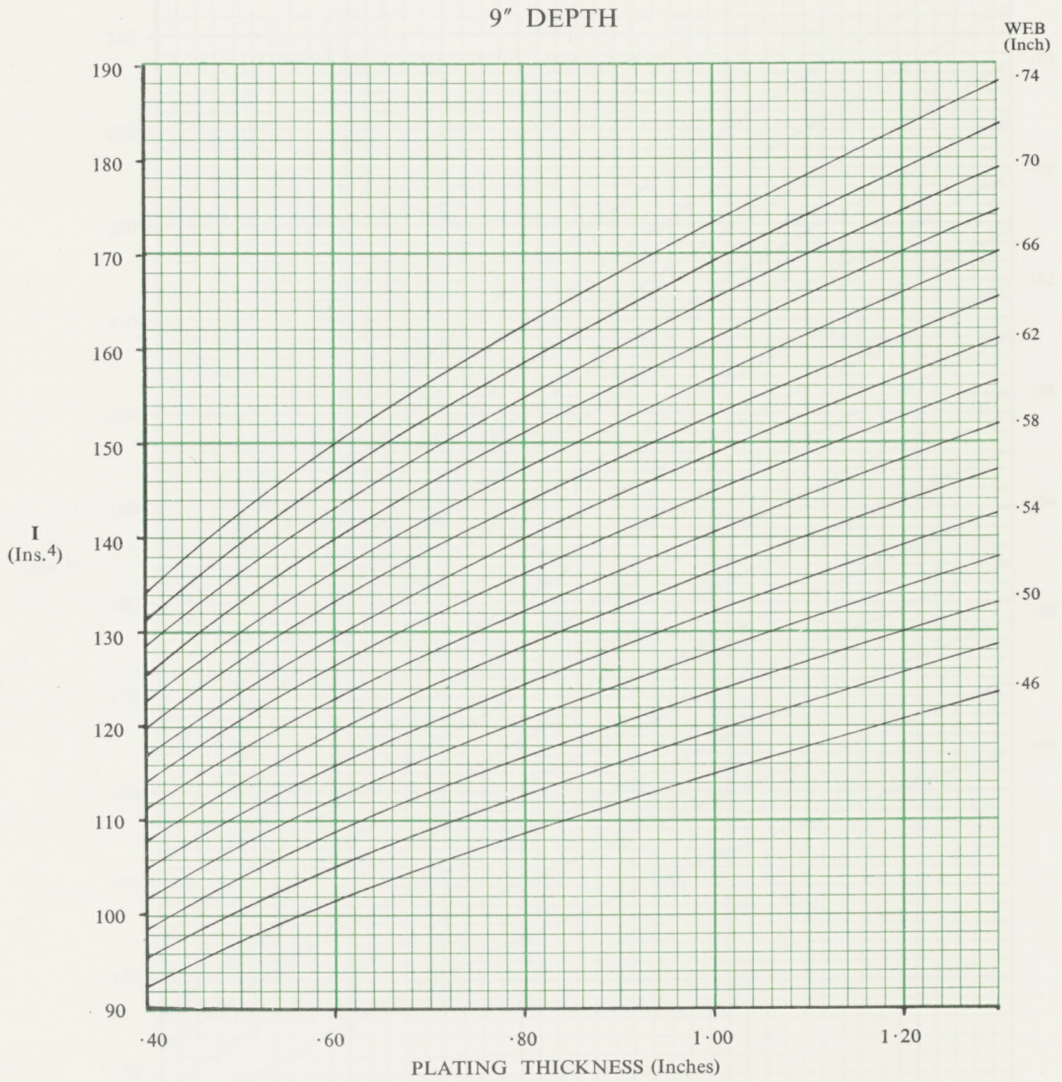


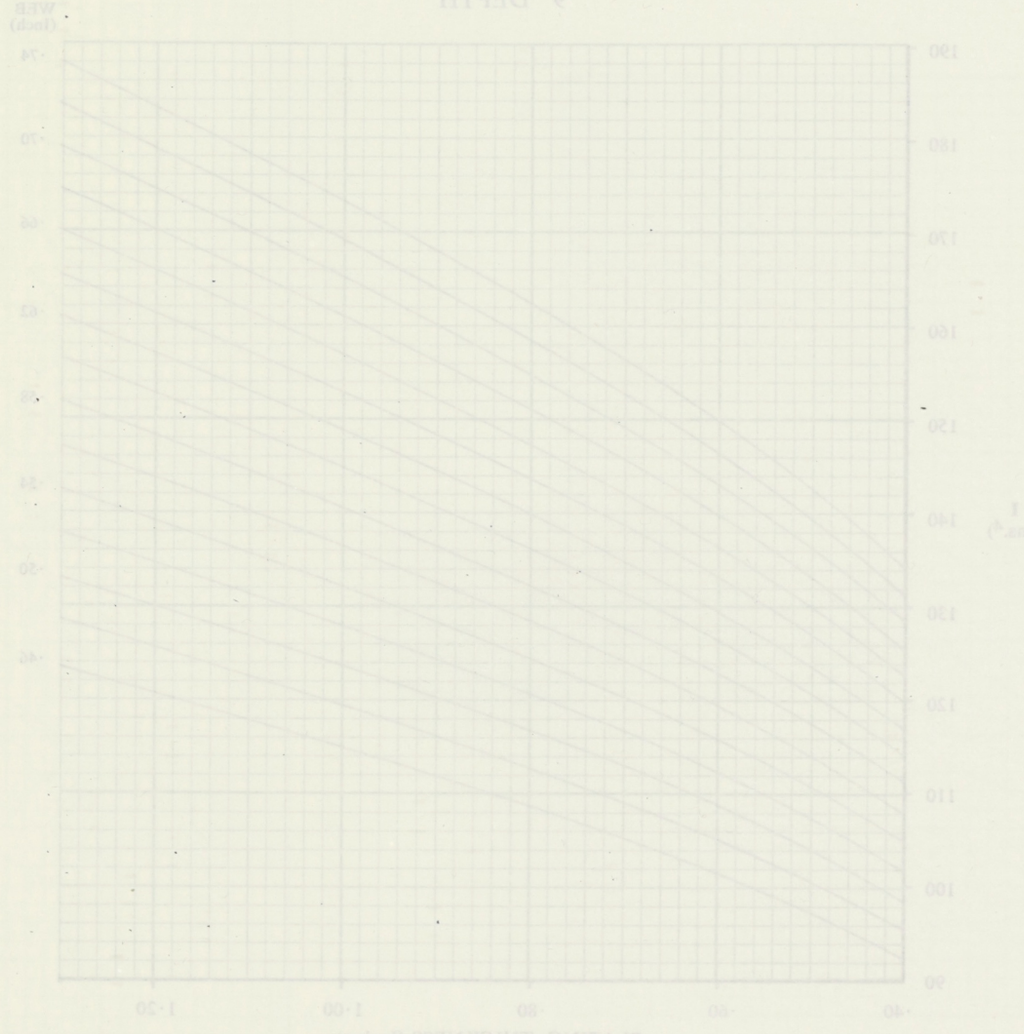
MOMENT OF INERTIA OF ORDINARY ANGLES

(WITH PLATING)



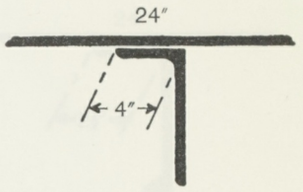
4″ FLANGE





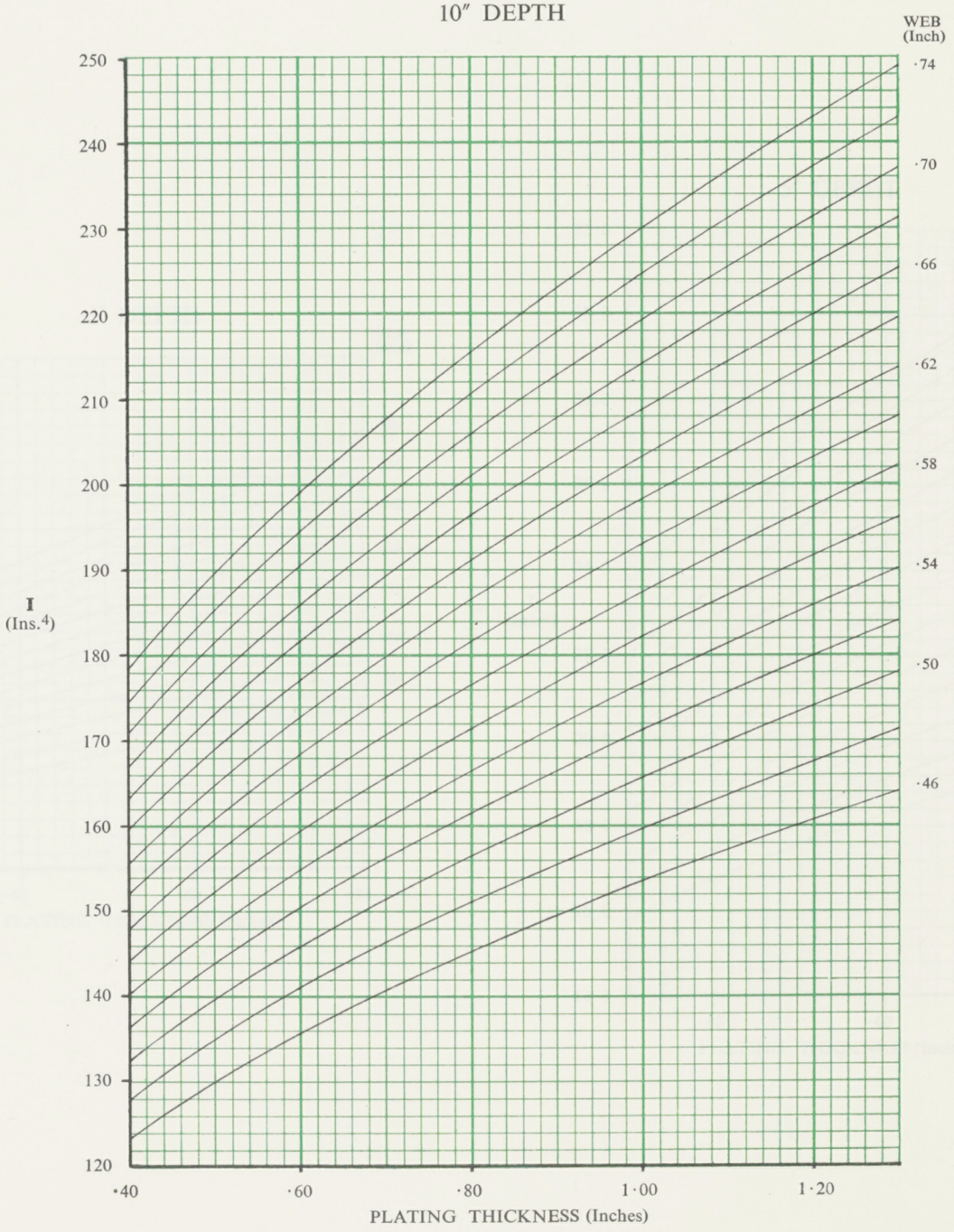
MOMENT OF INERTIA OF ORDINARY ANGLES

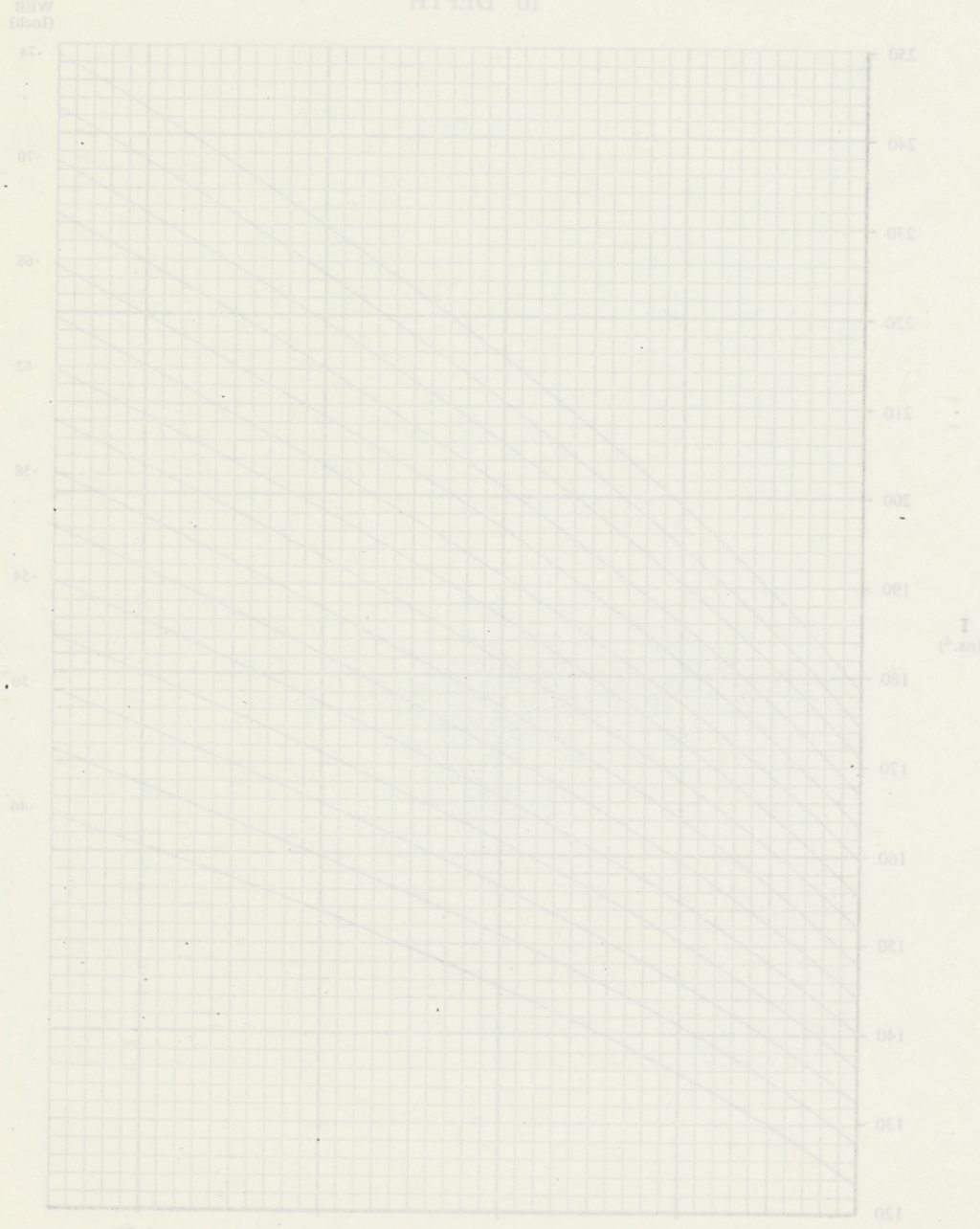
(WITH PLATING)



4″ FLANGE

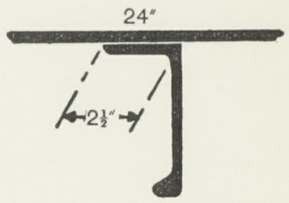
10″ DEPTH





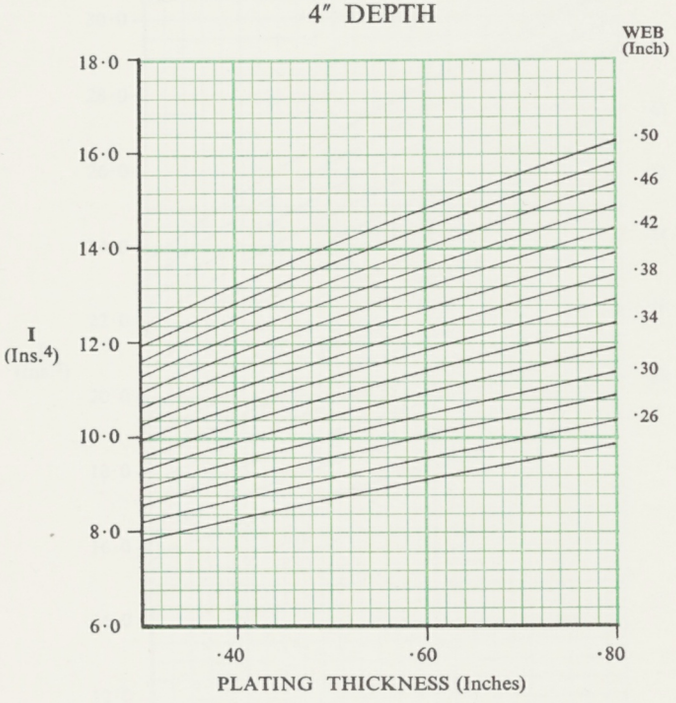
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)

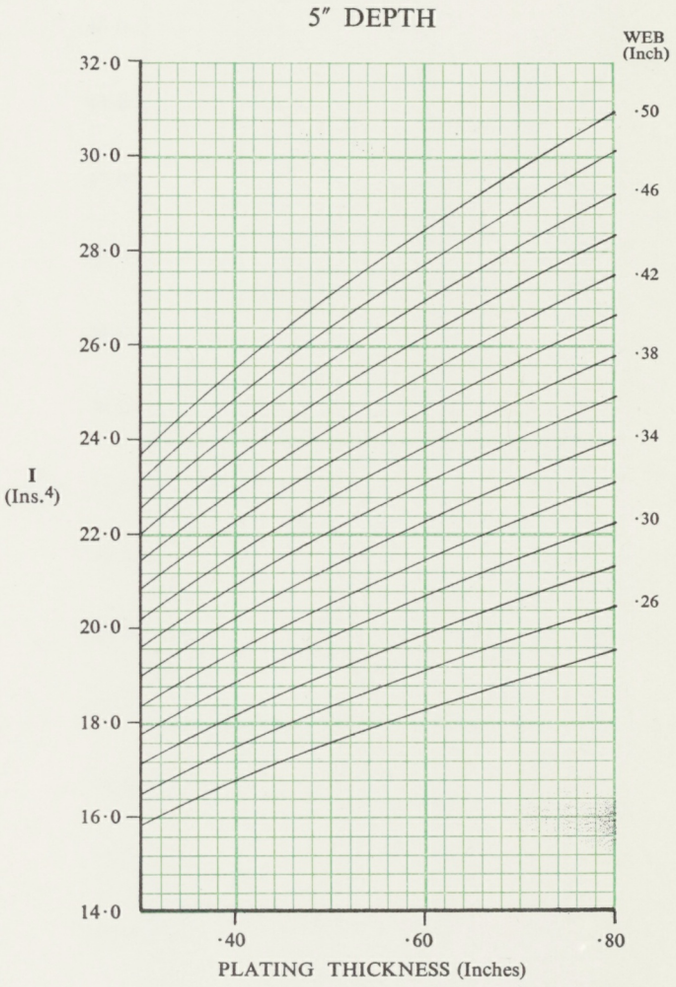


2½″ FLANGE

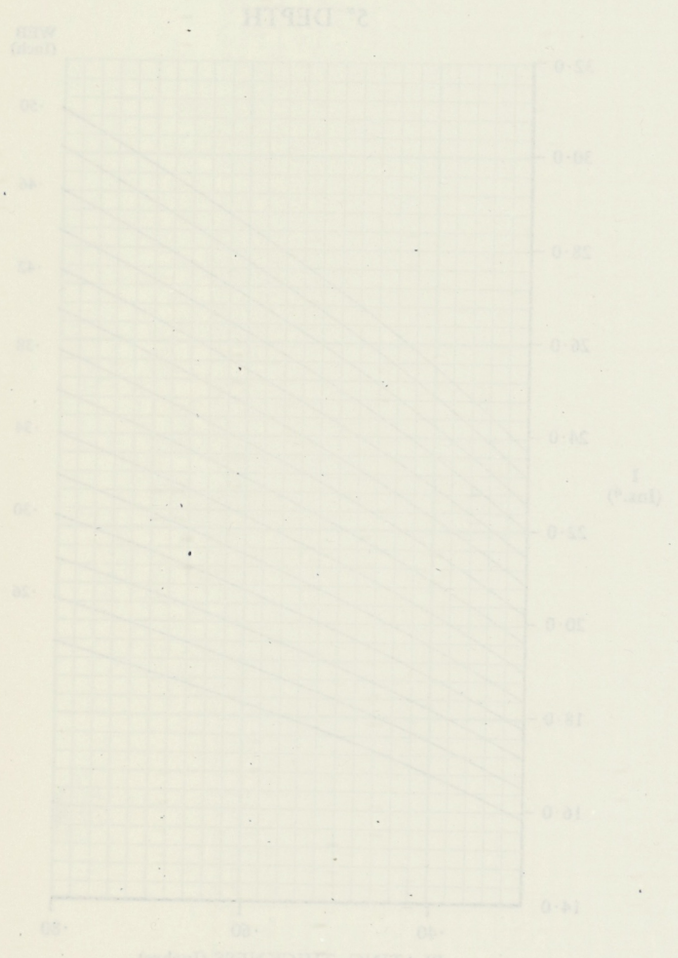
4″ DEPTH

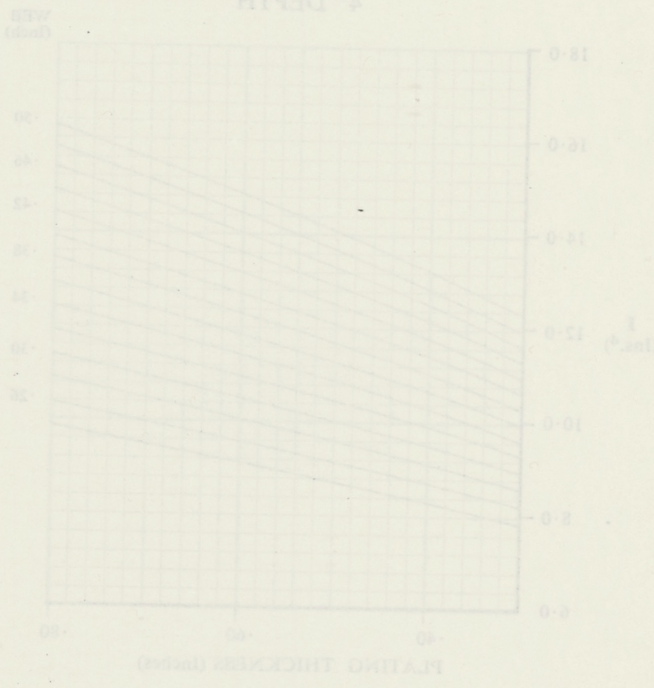


5″ DEPTH



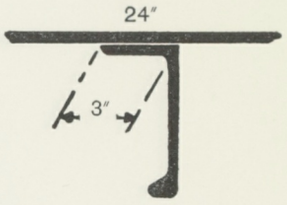
24"
A=21·4


5" DEPTH
WEB (Inch)
32·0
30·0
28·0
26·0
24·0
22·0
20·0
18·0
16·0
14·0
I (Inch⁴)
-40
-50
PLATING THICKNESS (Inches)


4" DEPTH
WEB (Inch)
18·0
16·0
14·0
12·0
10·0
8·0
6·0
I (Inch⁴)
-40
-50
PLATING THICKNESS (Inches)

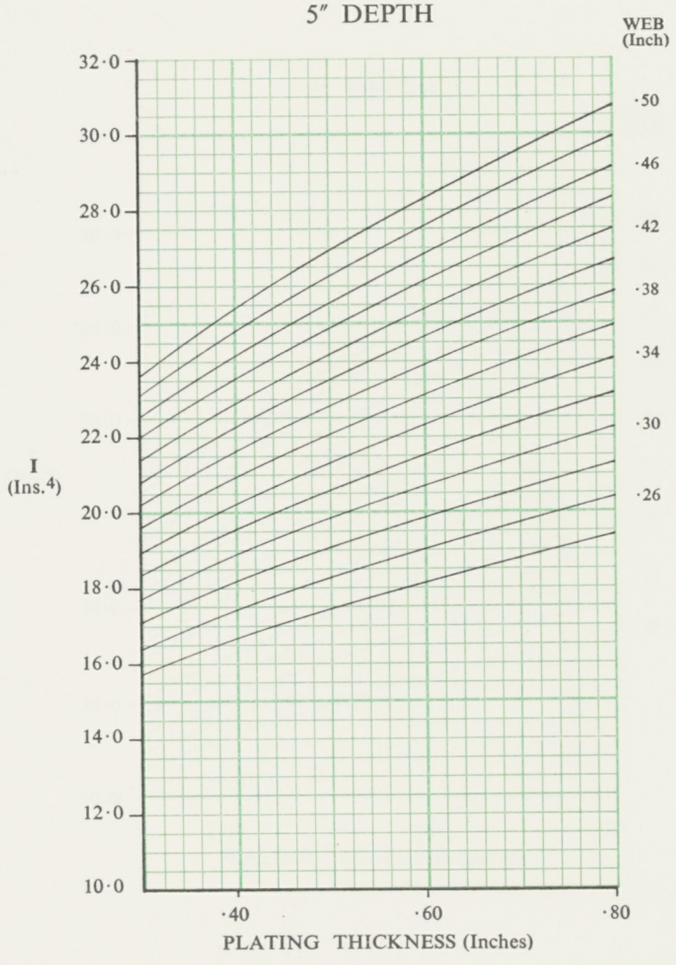
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)

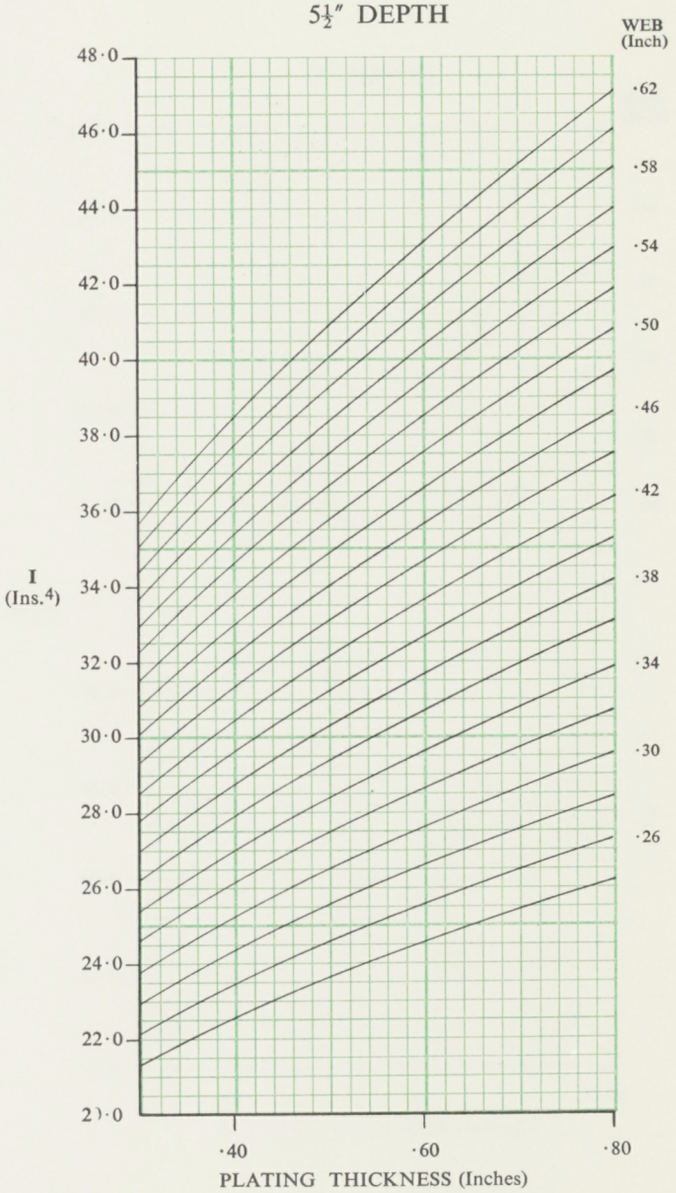


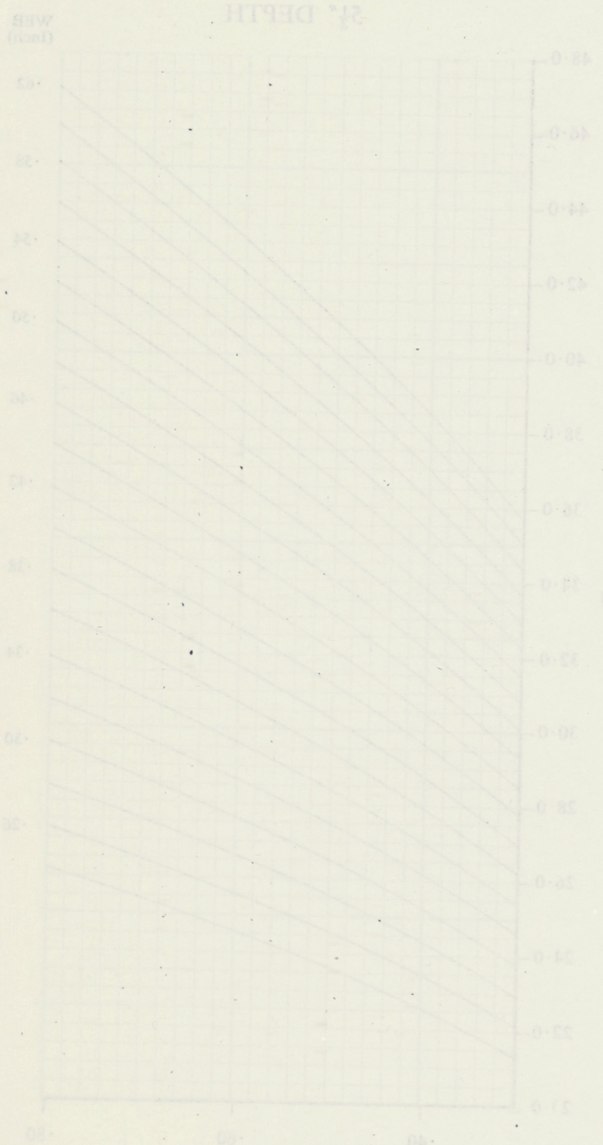
3″ FLANGE

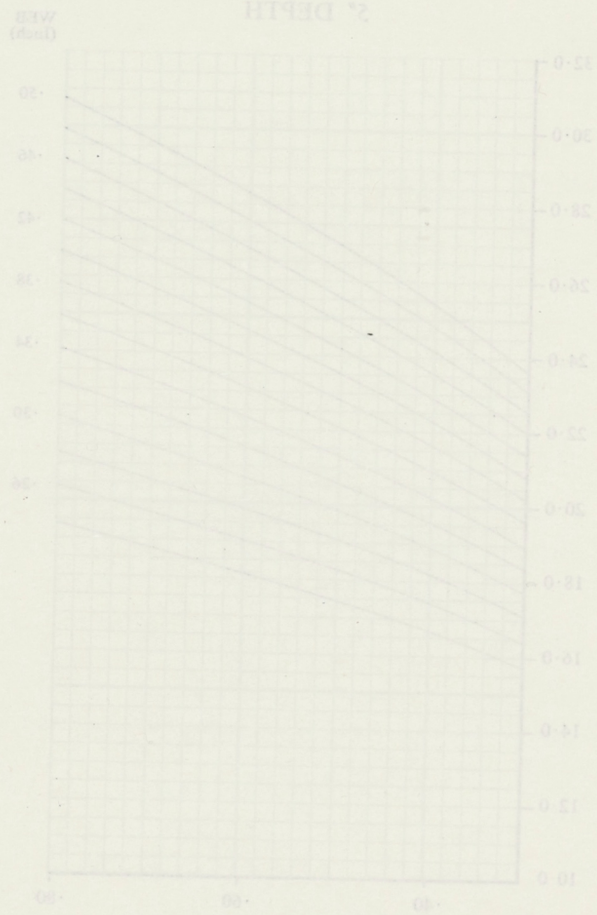
5″ DEPTH



5½″ DEPTH

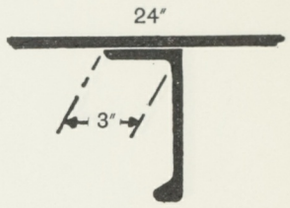






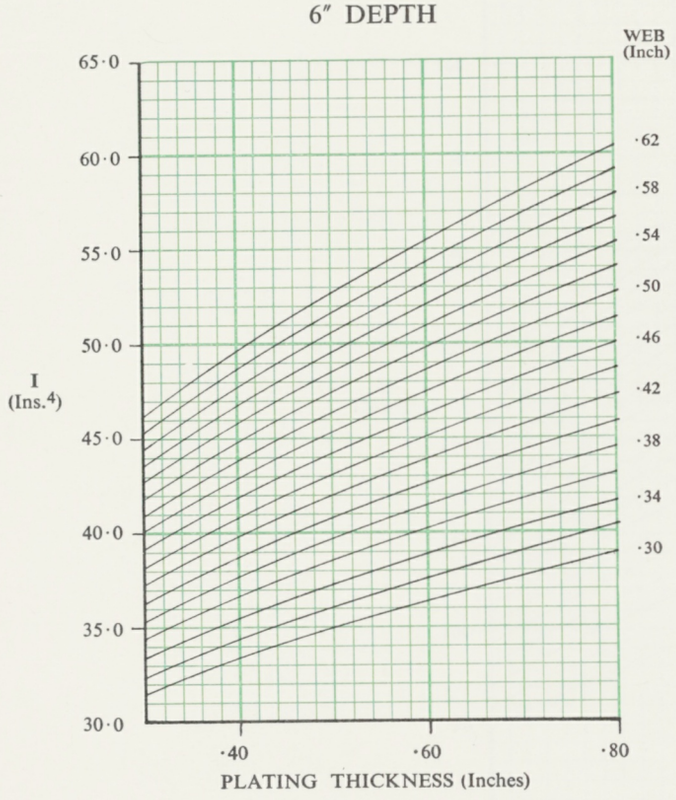
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)

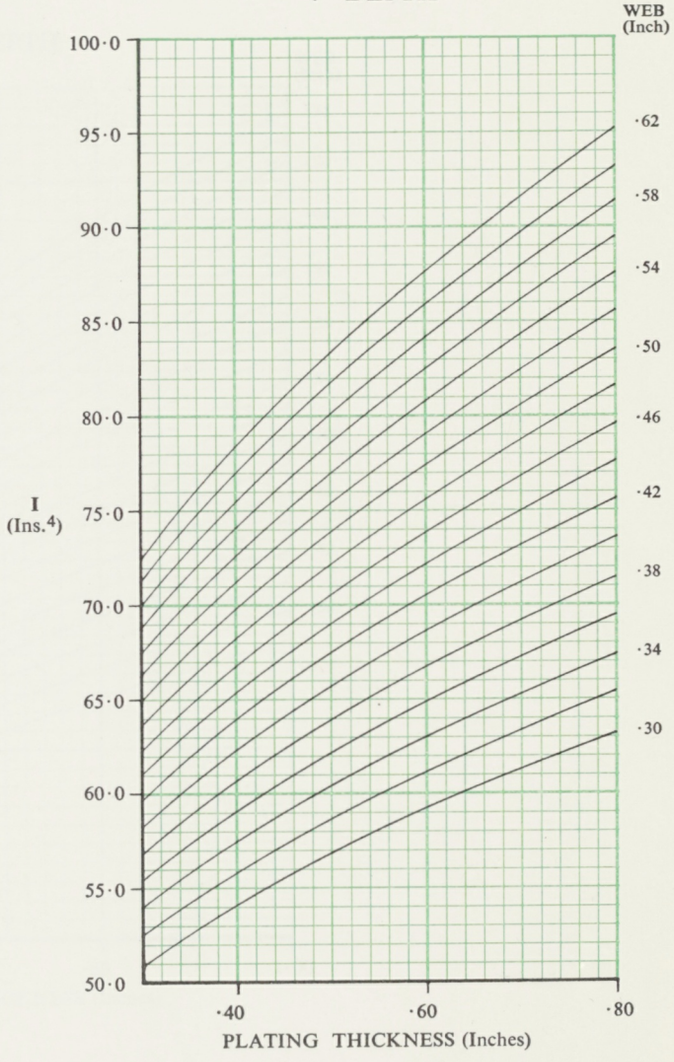


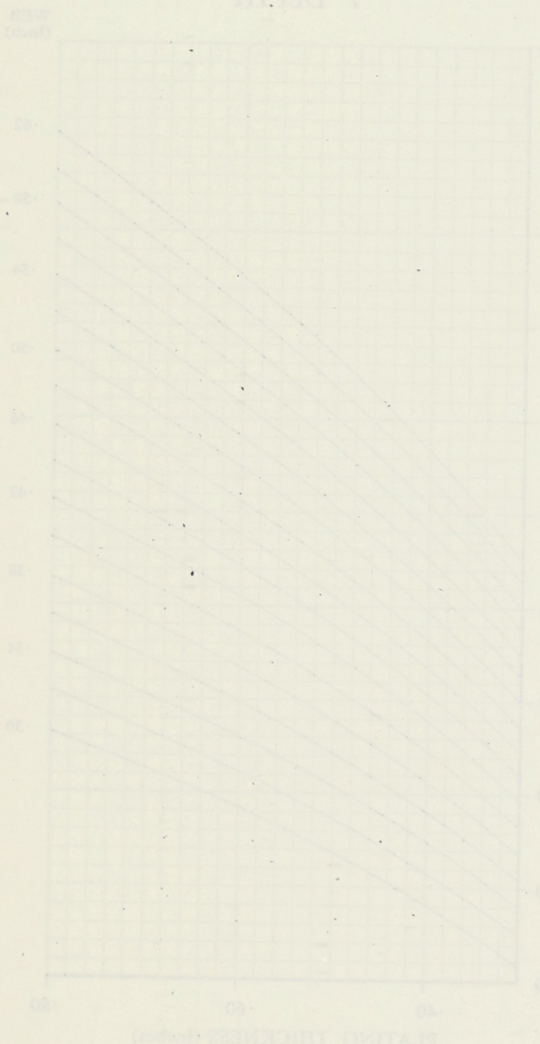
3″ FLANGE

6″ DEPTH



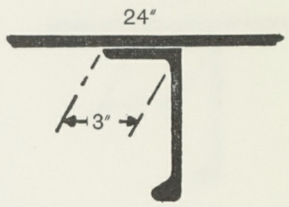
7″ DEPTH





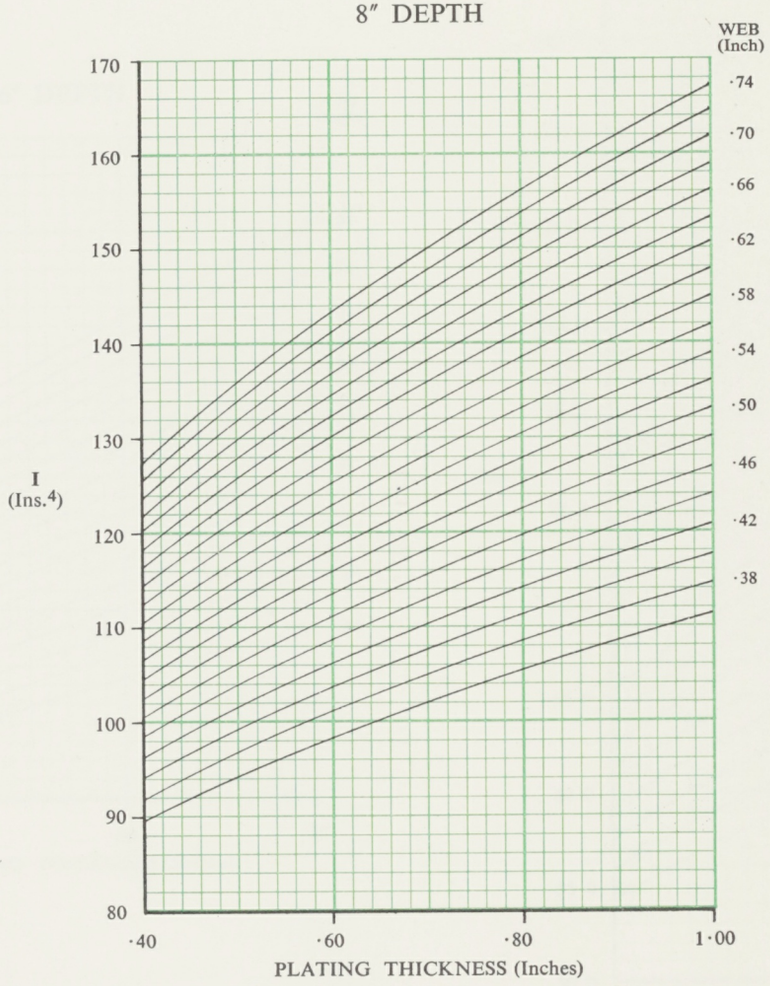
MOMENT OF INERTIA OF BULB ANGLES

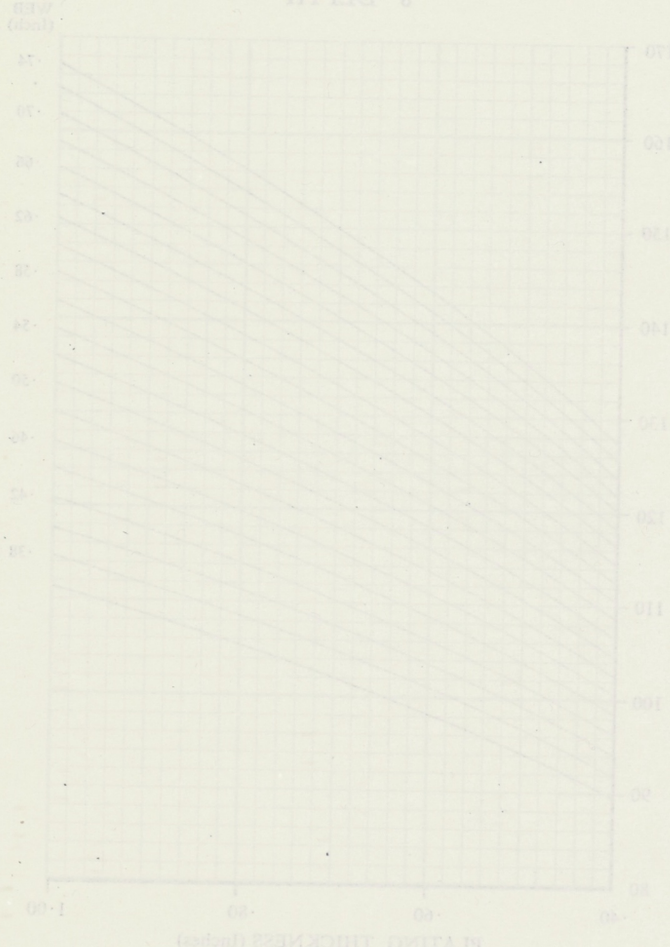
(WITH PLATING)



3″ FLANGE

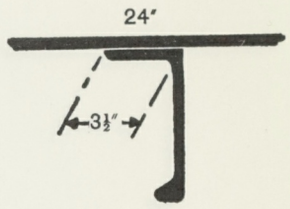
8″ DEPTH





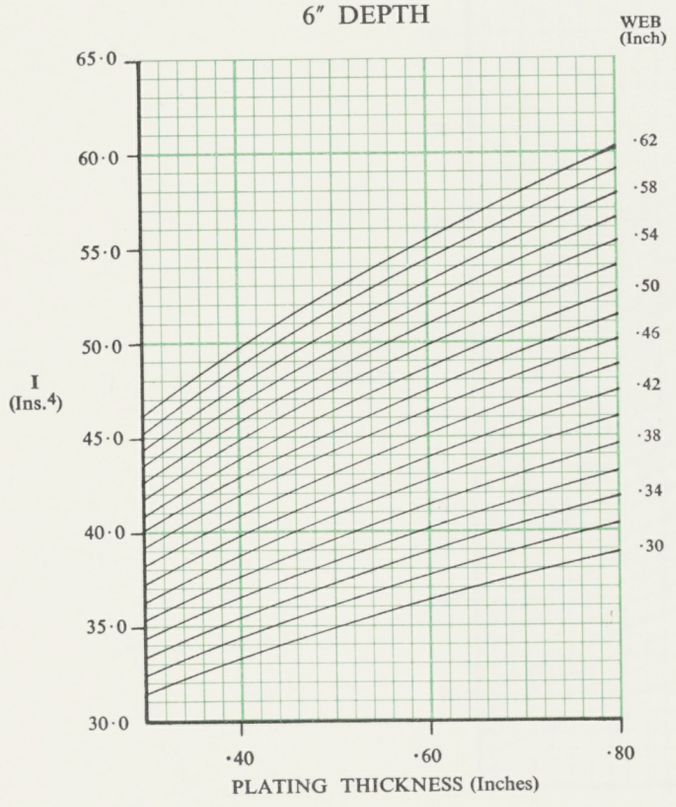
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)

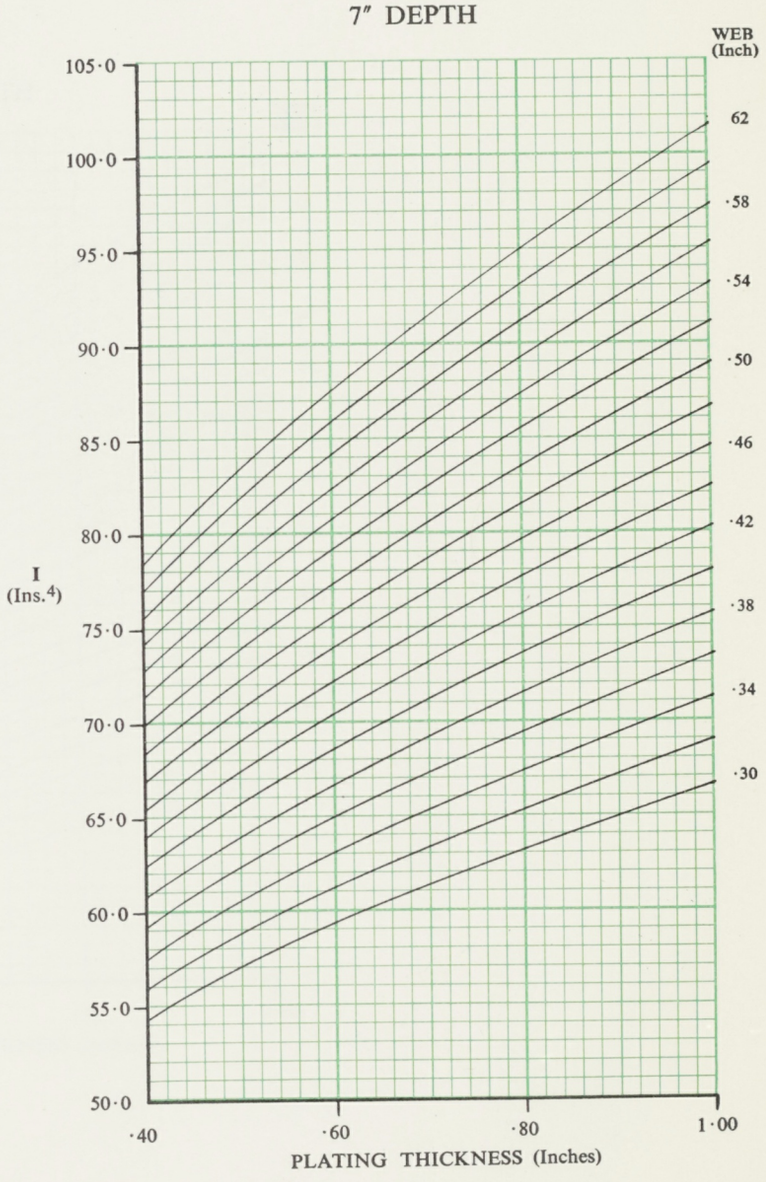


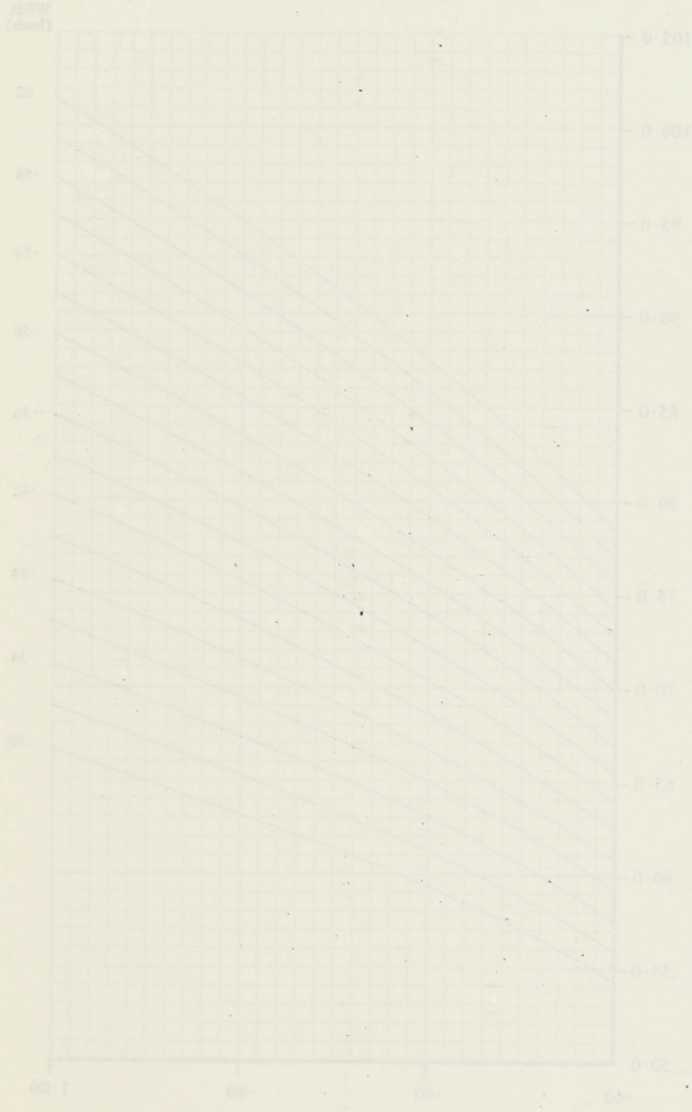
3½″ FLANGE

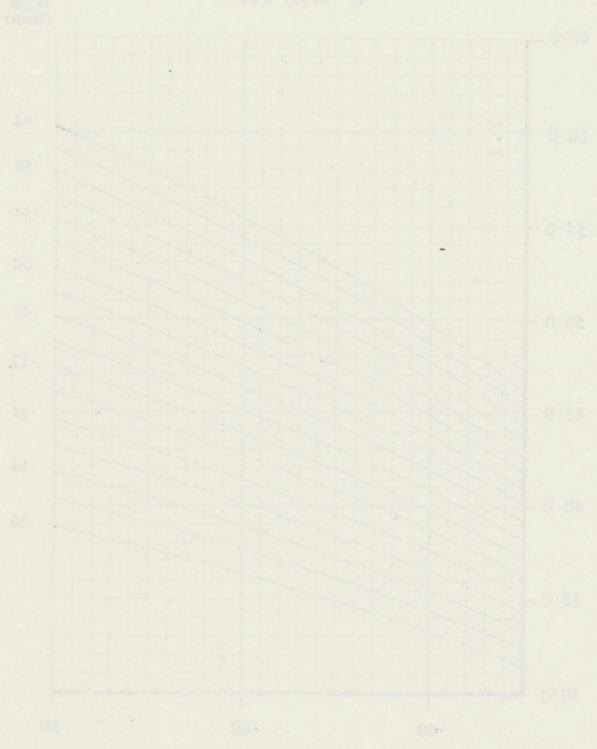
6″ DEPTH



7″ DEPTH

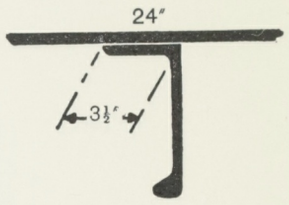




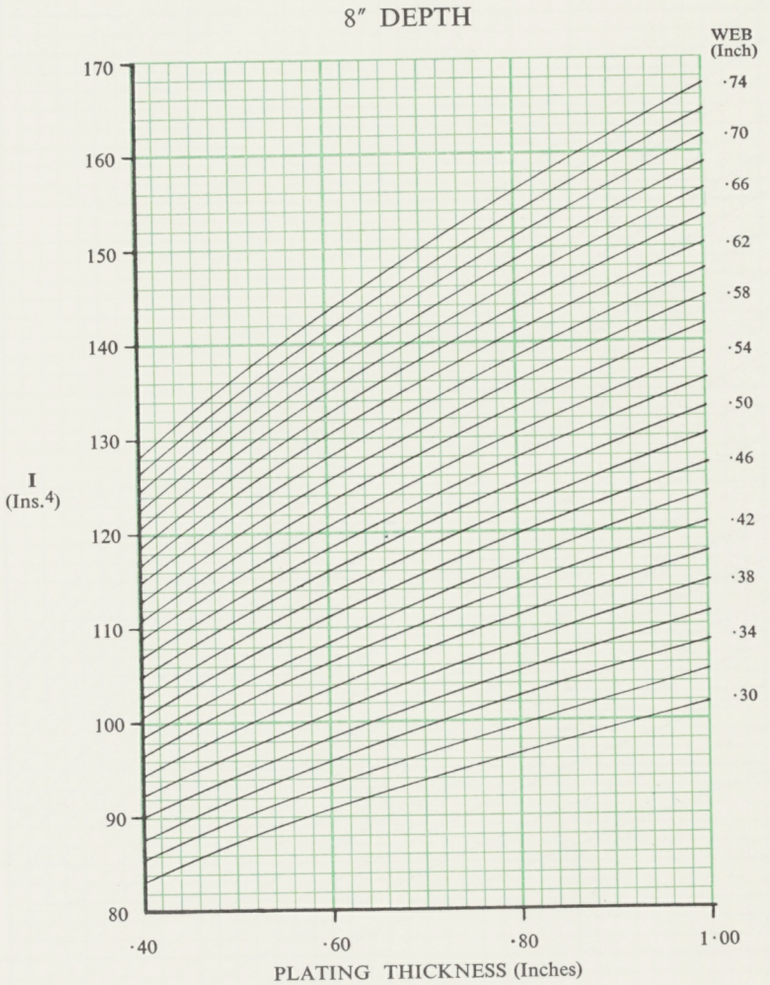


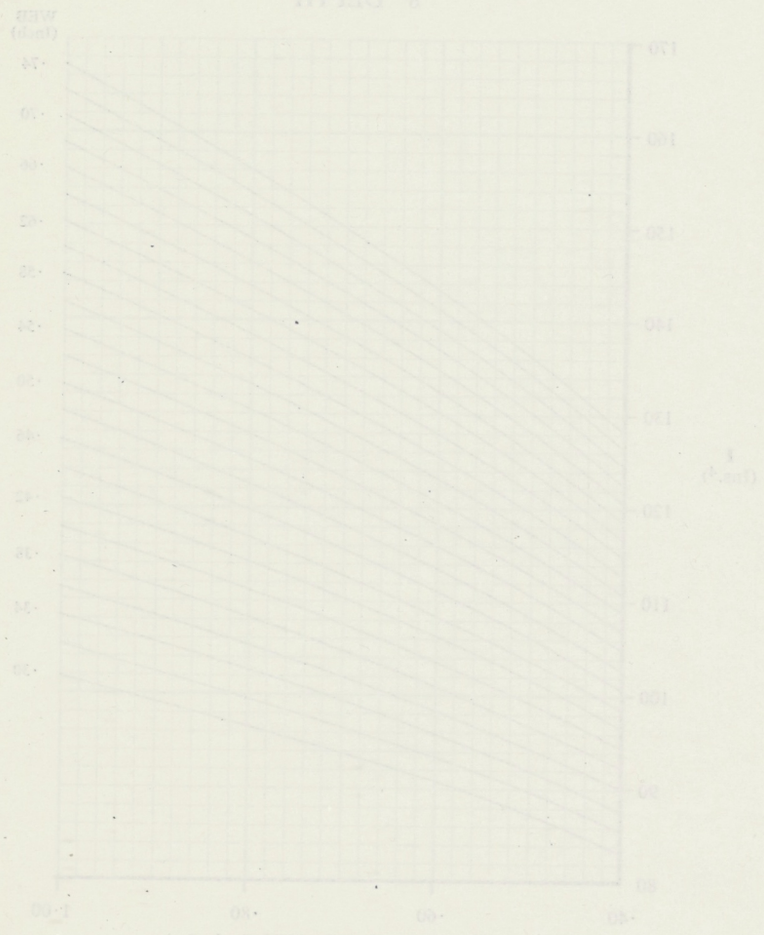
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)



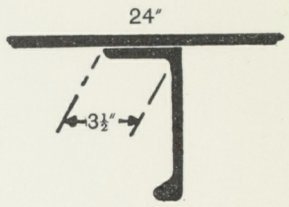
3½″ FLANGE



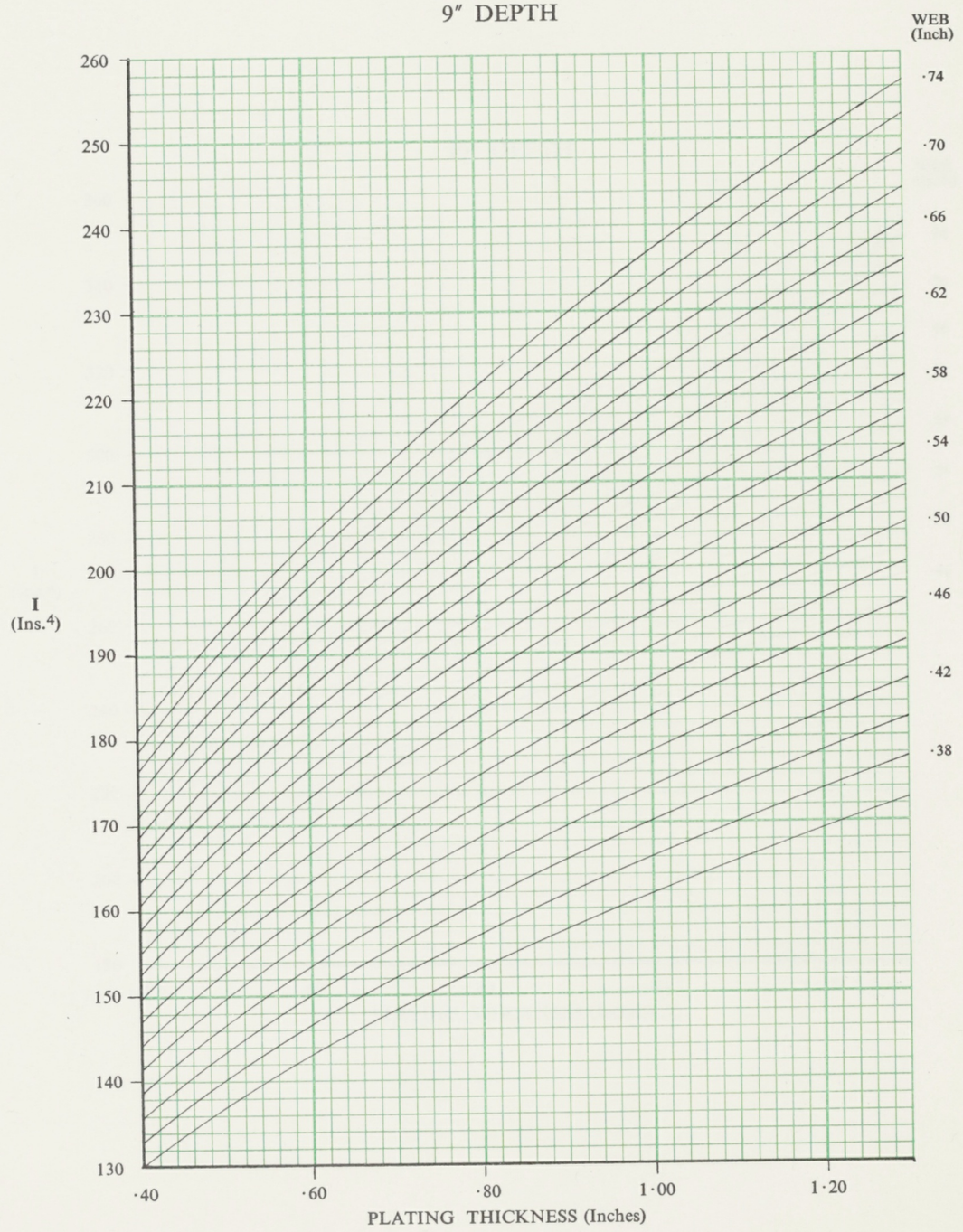


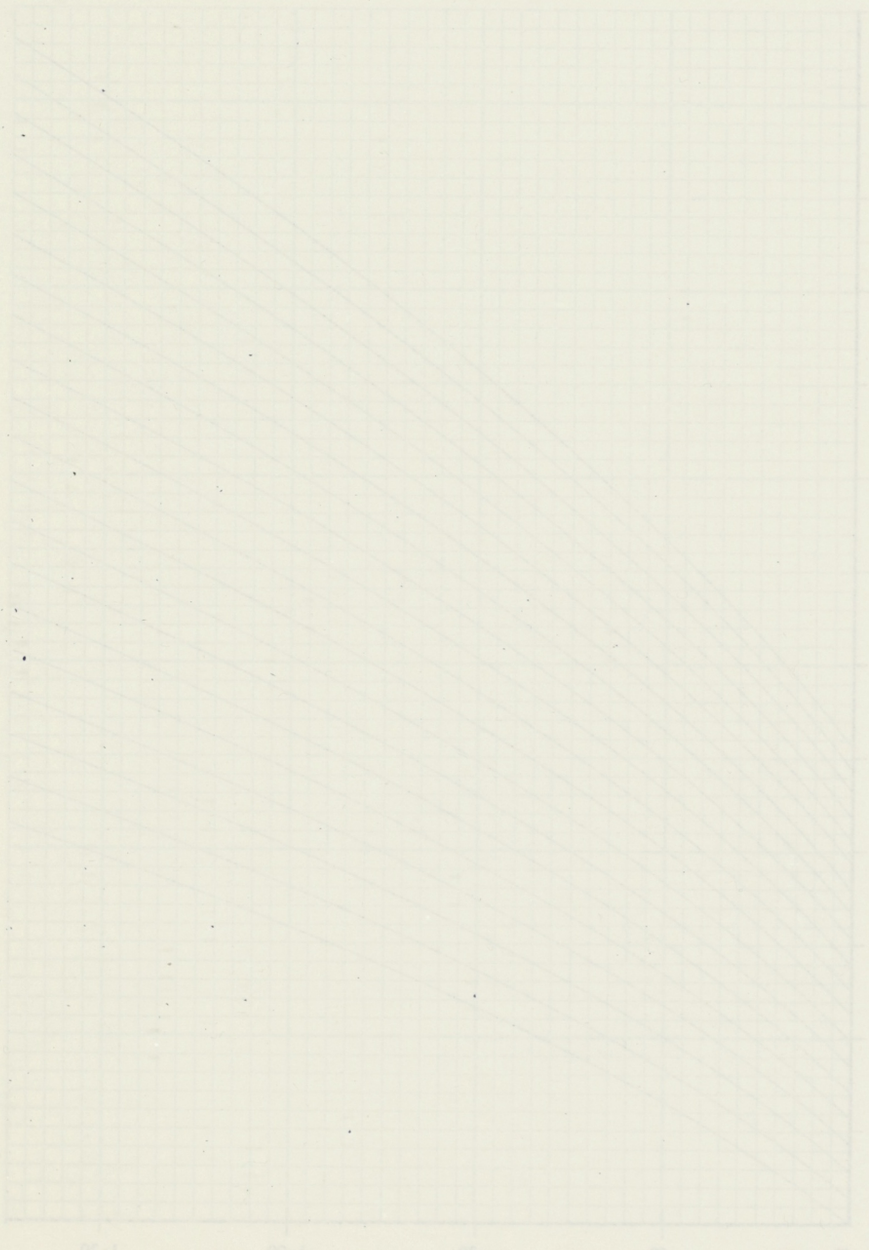
MOMENT OF INERTIA OF BULB ANGLES

WITH PLATING)



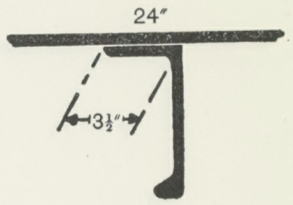
3½″ FLANGE



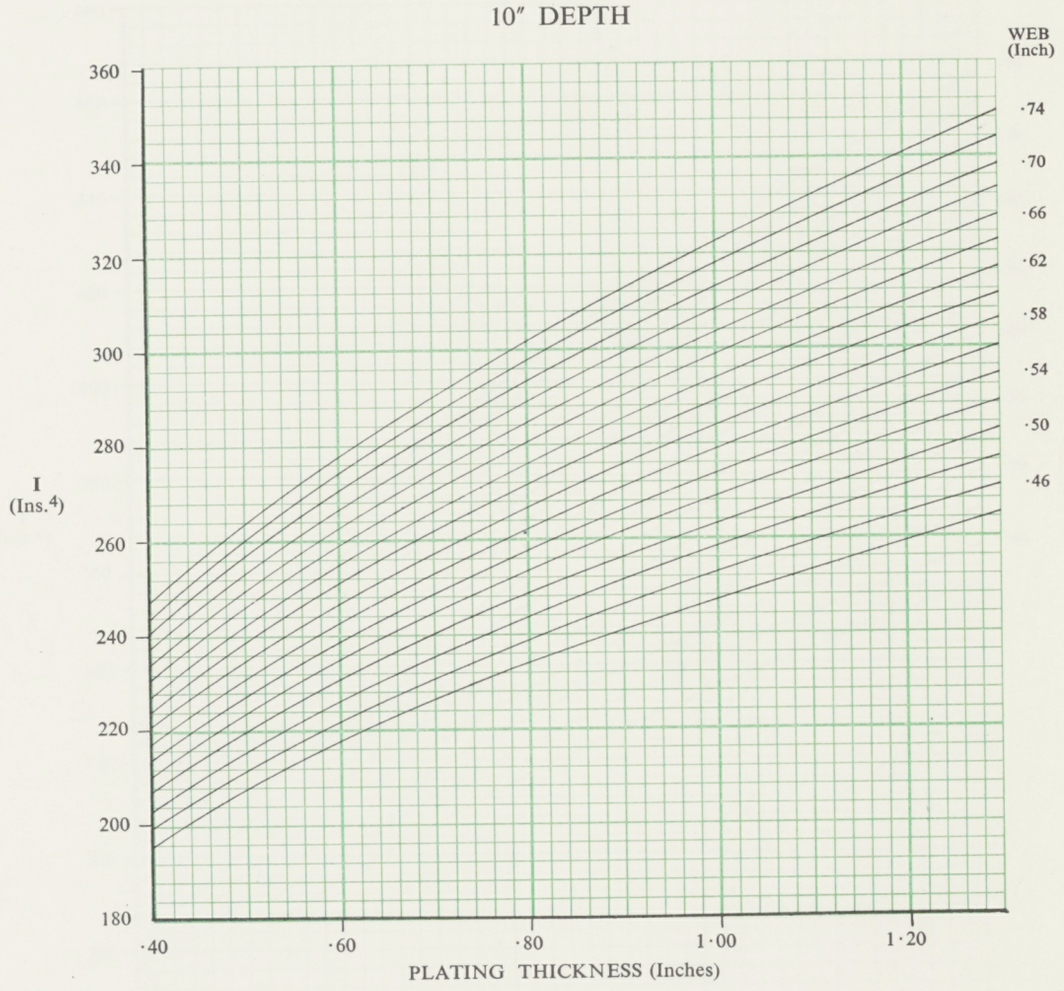


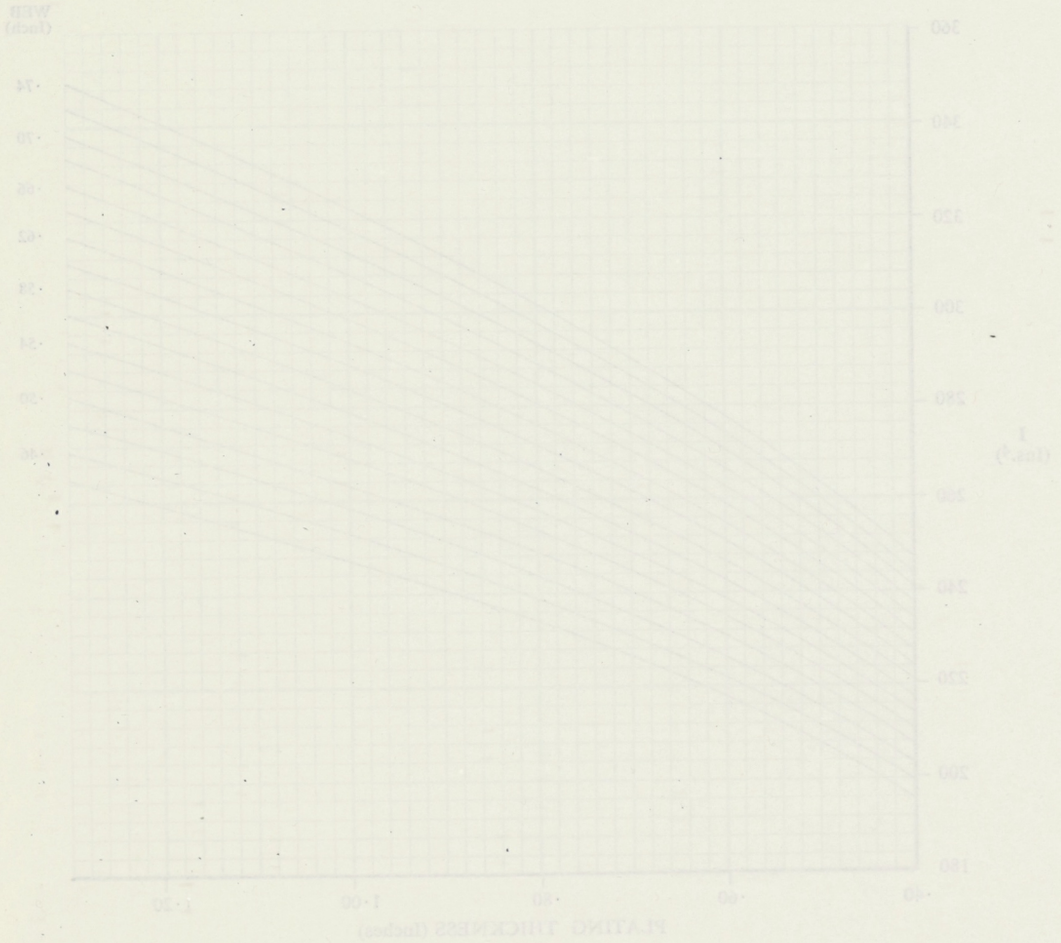
MOMENT OF INERTIA OF BULB ANGLES

WITH PLATING)



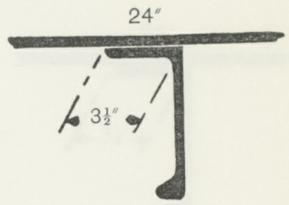
3½″ FLANGE





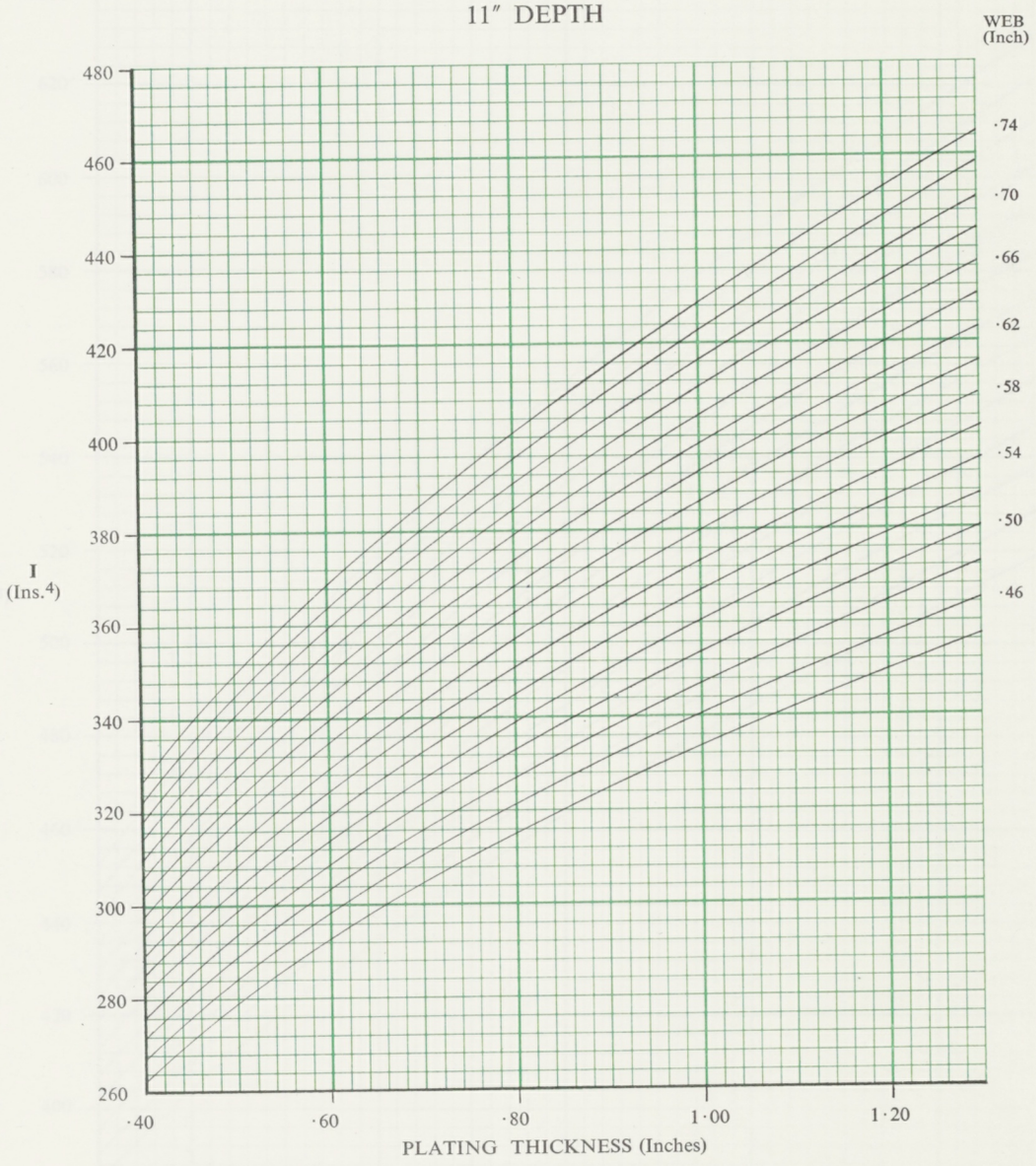
MOMENT OF INERTIA OF BULB ANGLES

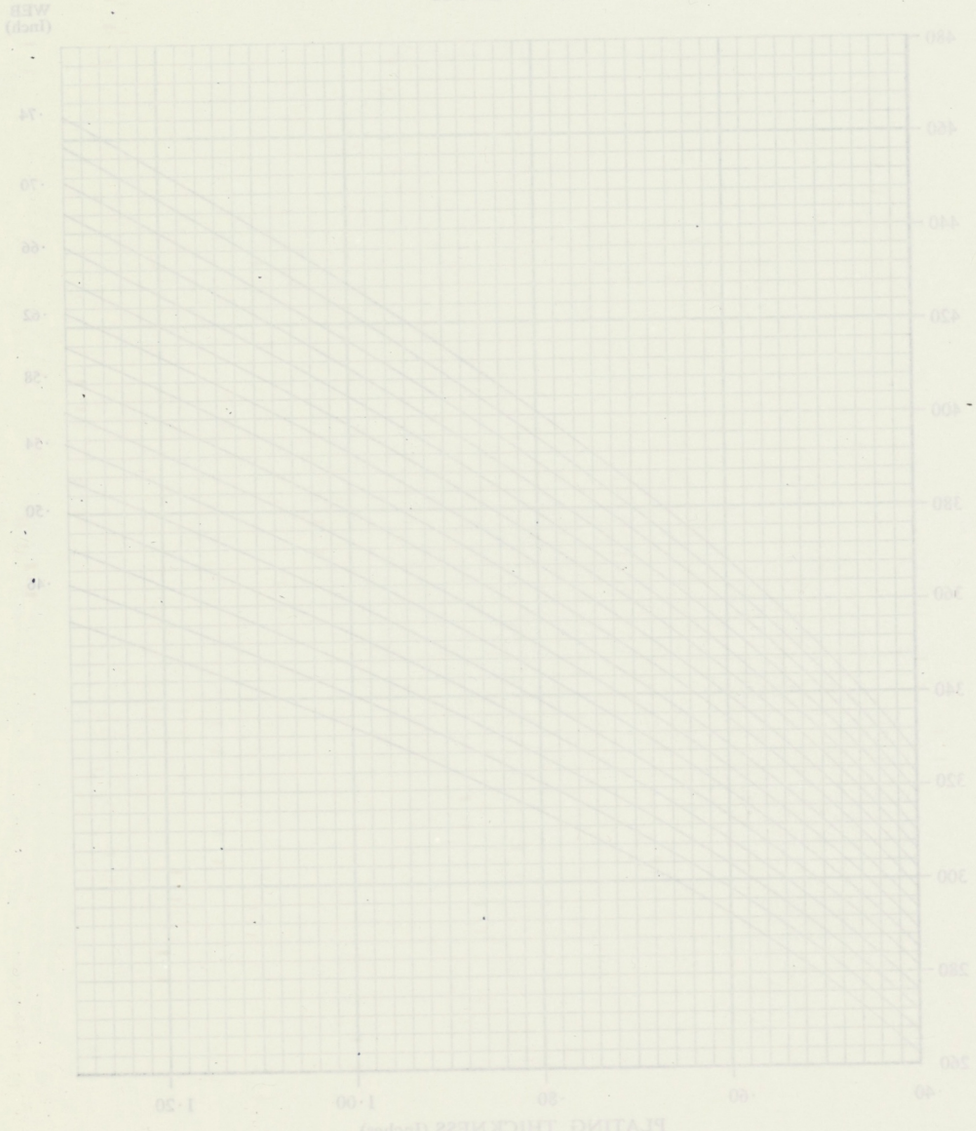
(WITH PLATING)



3½″ FLANGE

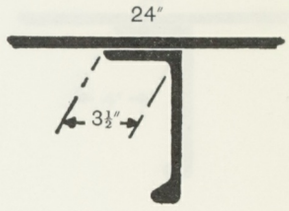
11″ DEPTH





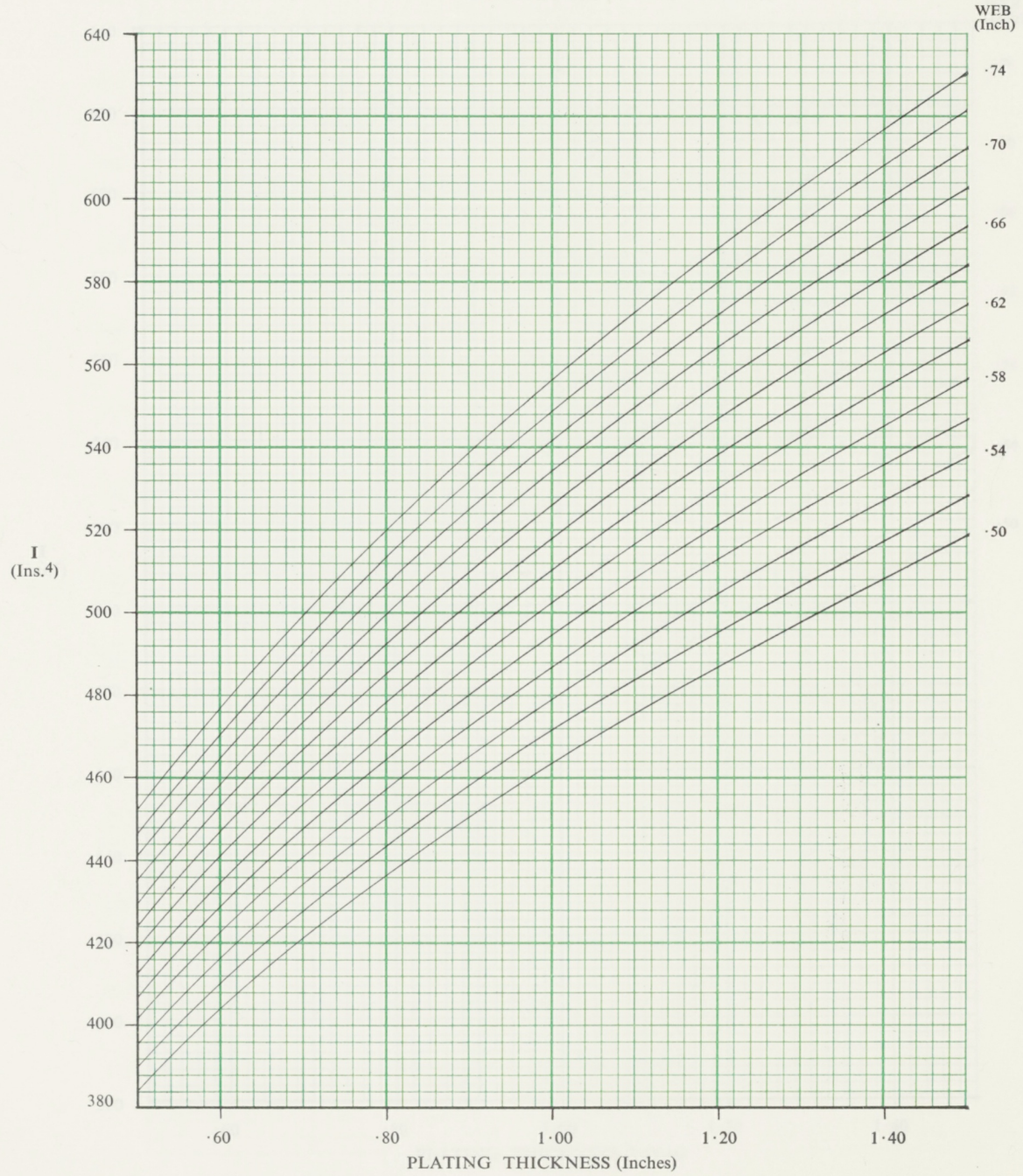
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)

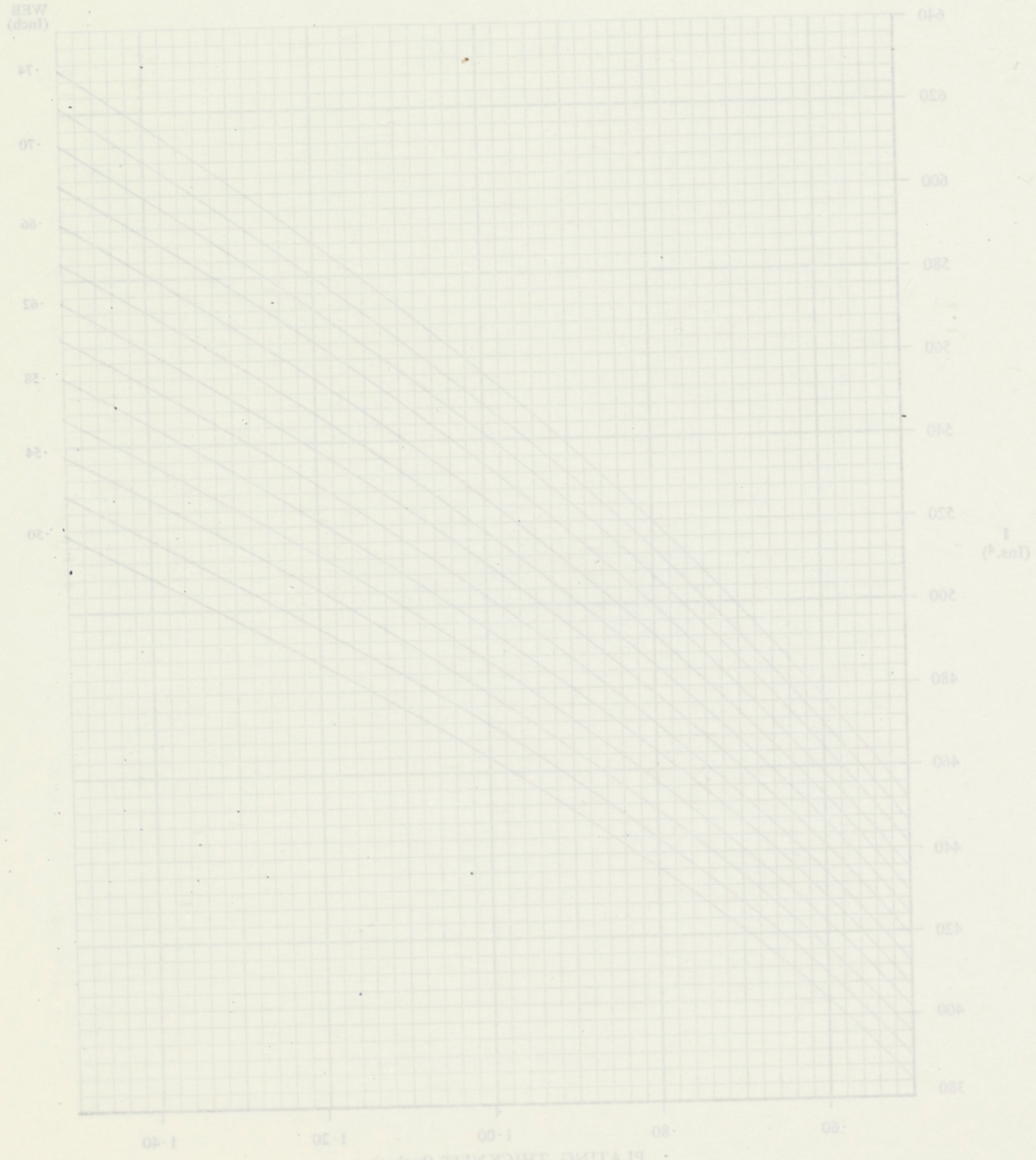


3½″ FLANGE

12″ DEPTH

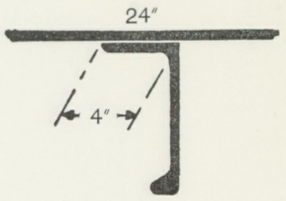


24"
31"



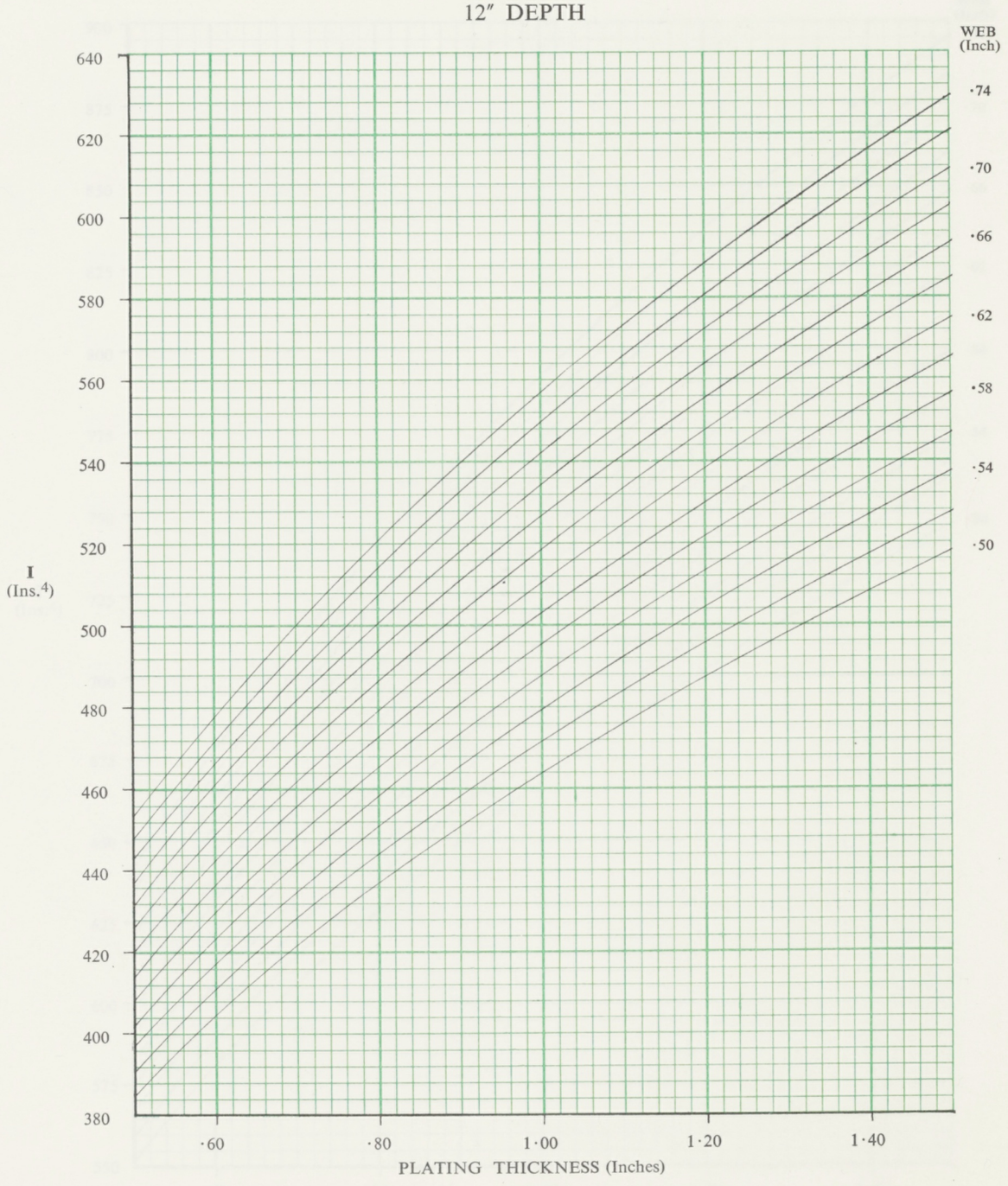
MOMENT OF INERTIA OF BULB ANGLES

(WITH PLATING)



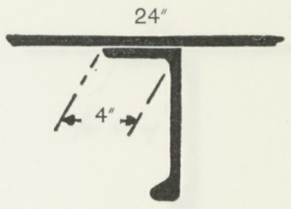
4″ FLANGE

12″ DEPTH



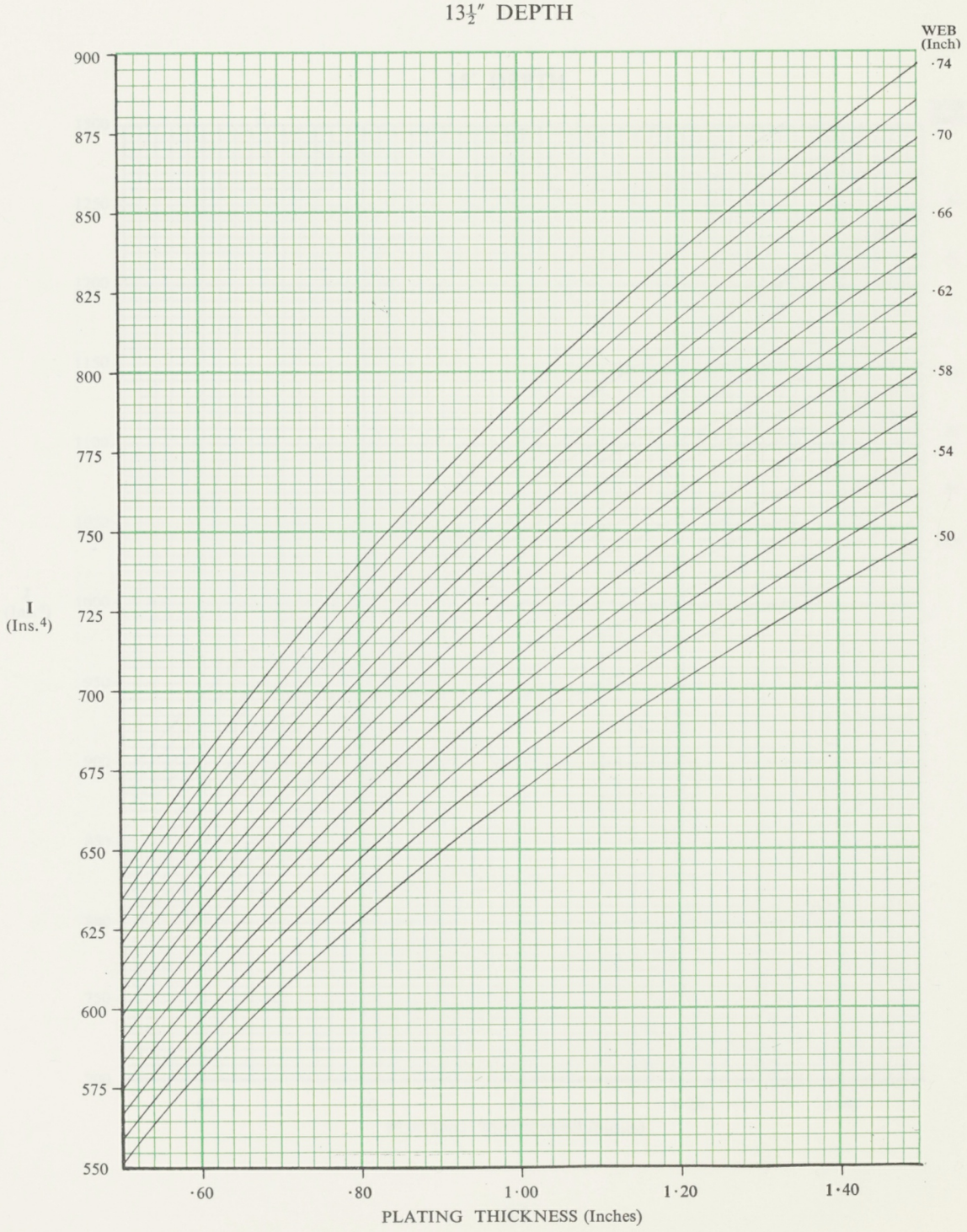
MOMENT OF INERTIA OF BULB ANGLES

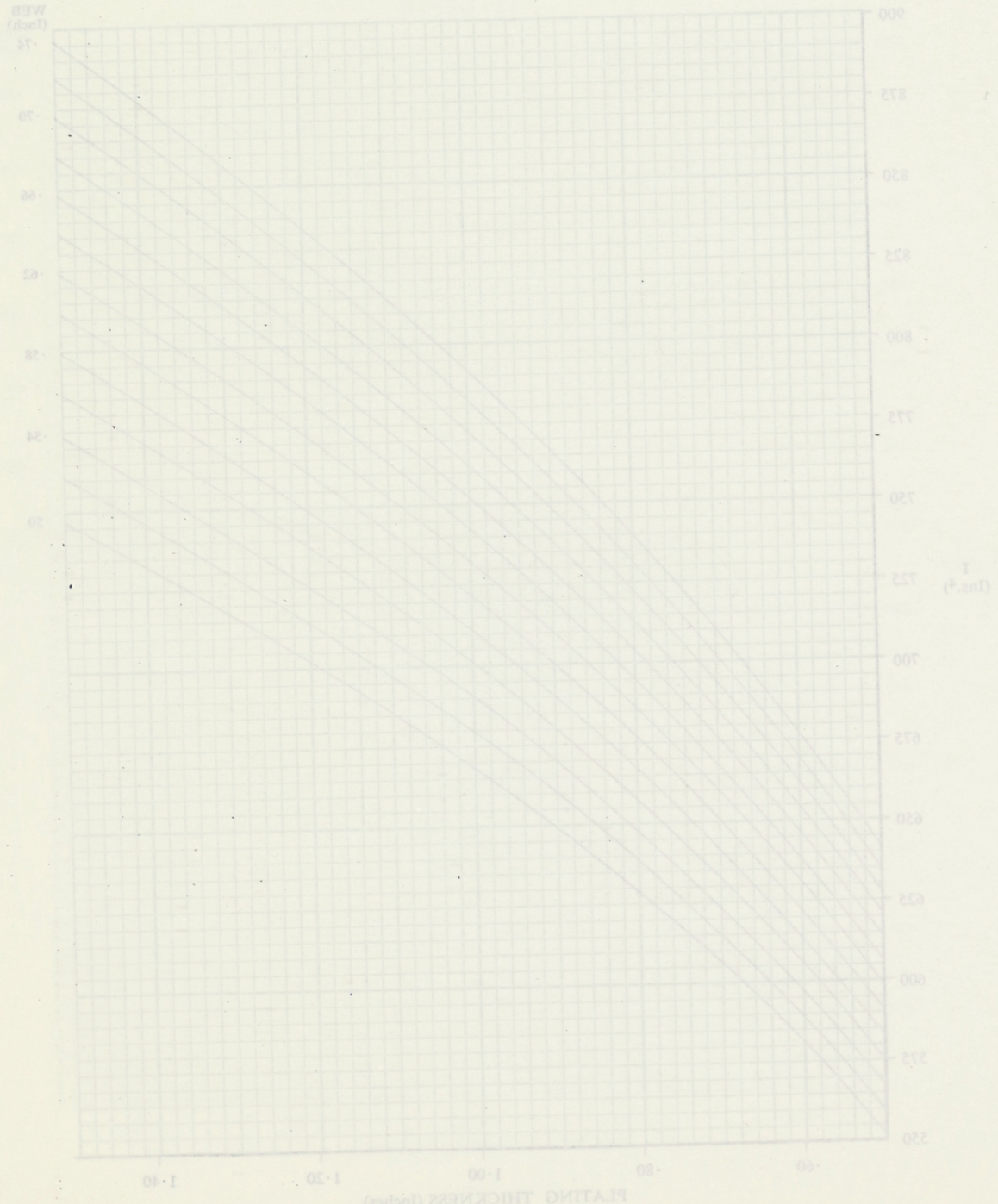
(WITH PLATING)



4″ FLANGE

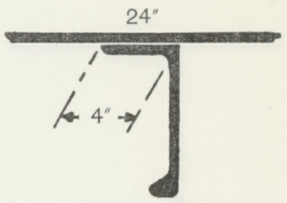
13½″ DEPTH





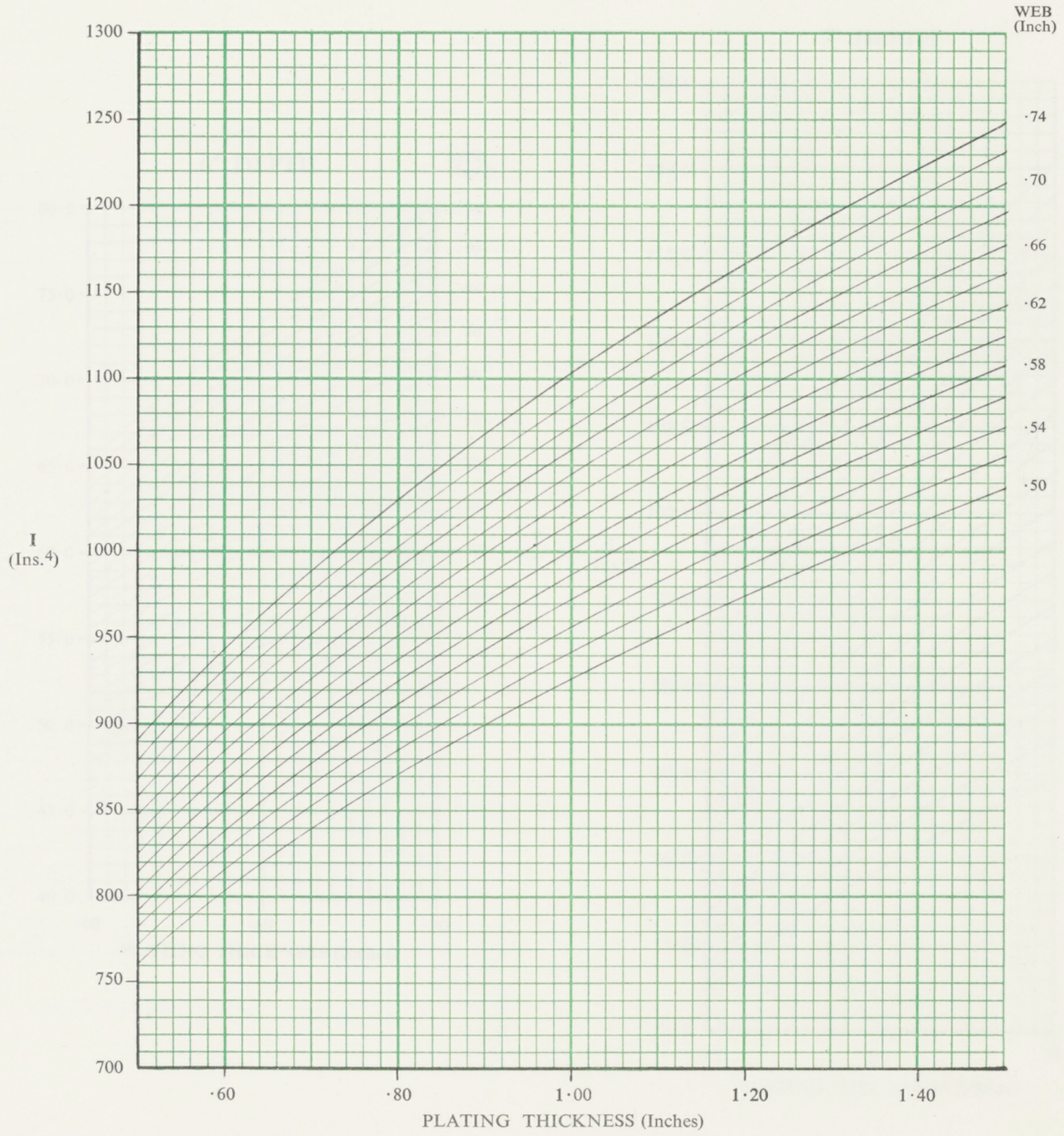
MOMENT OF INERTIA OF BULB ANGLES

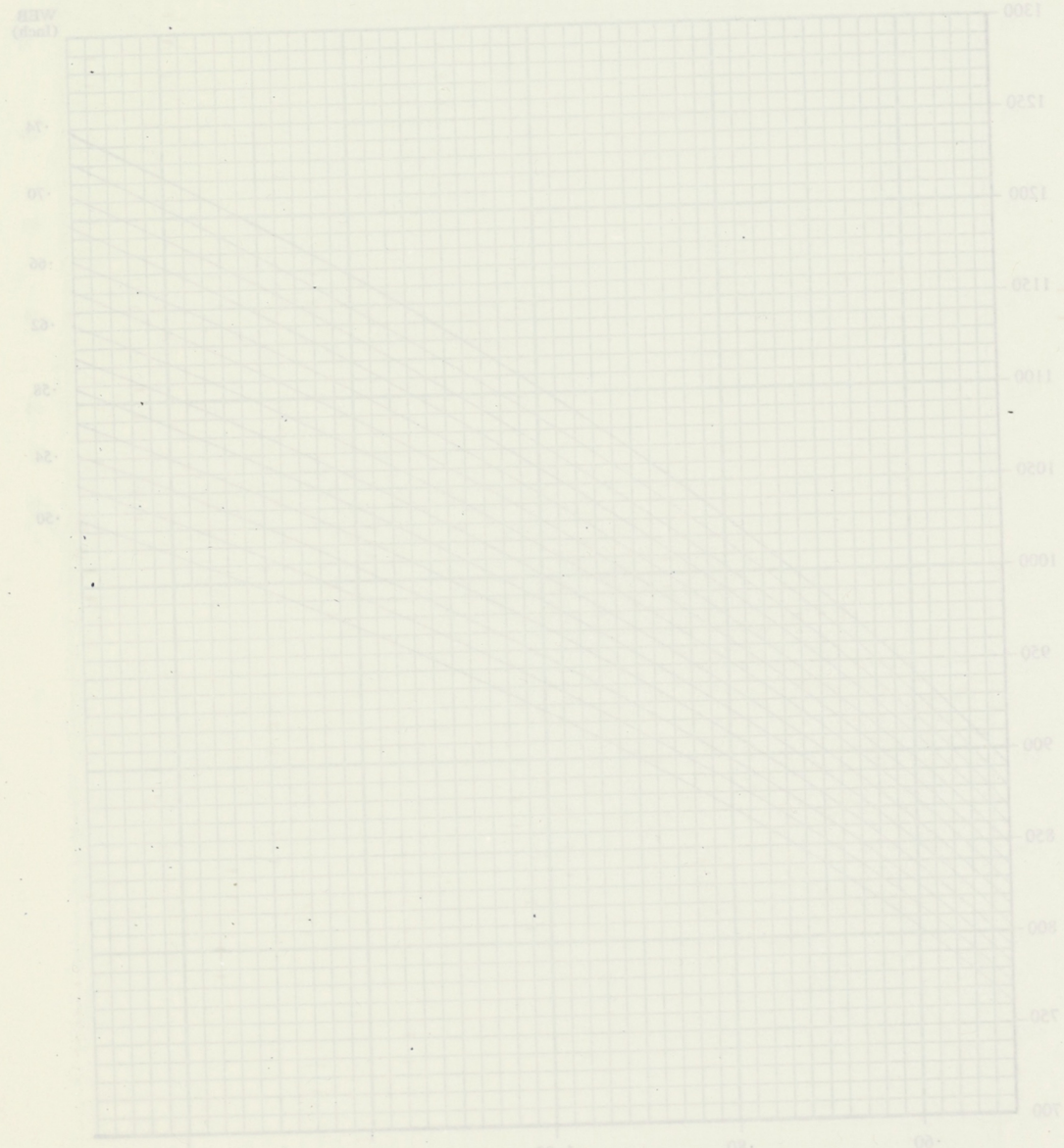
(WITH PLATING)



4″ FLANGE

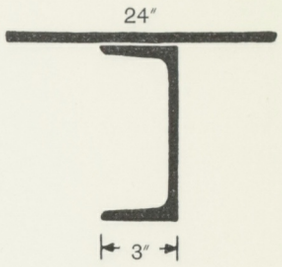
15″ DEPTH





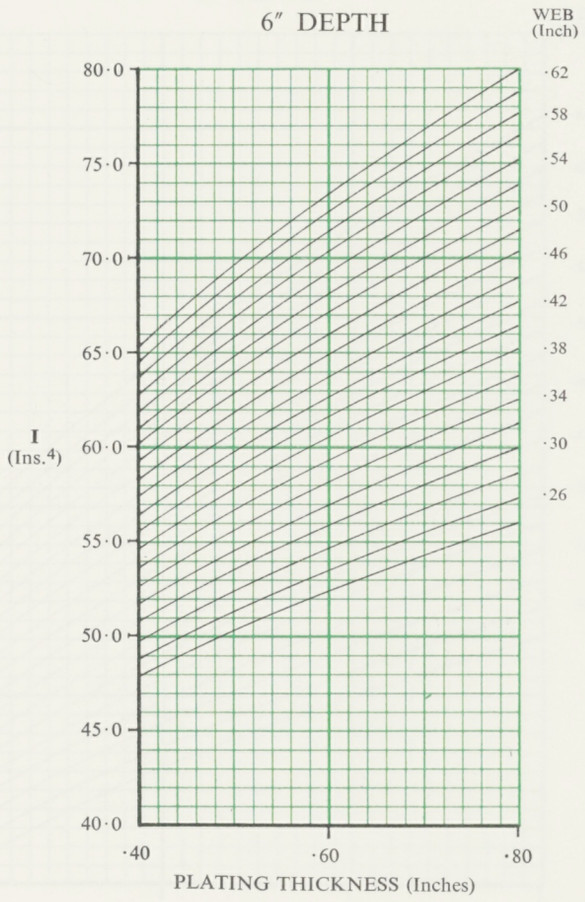
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

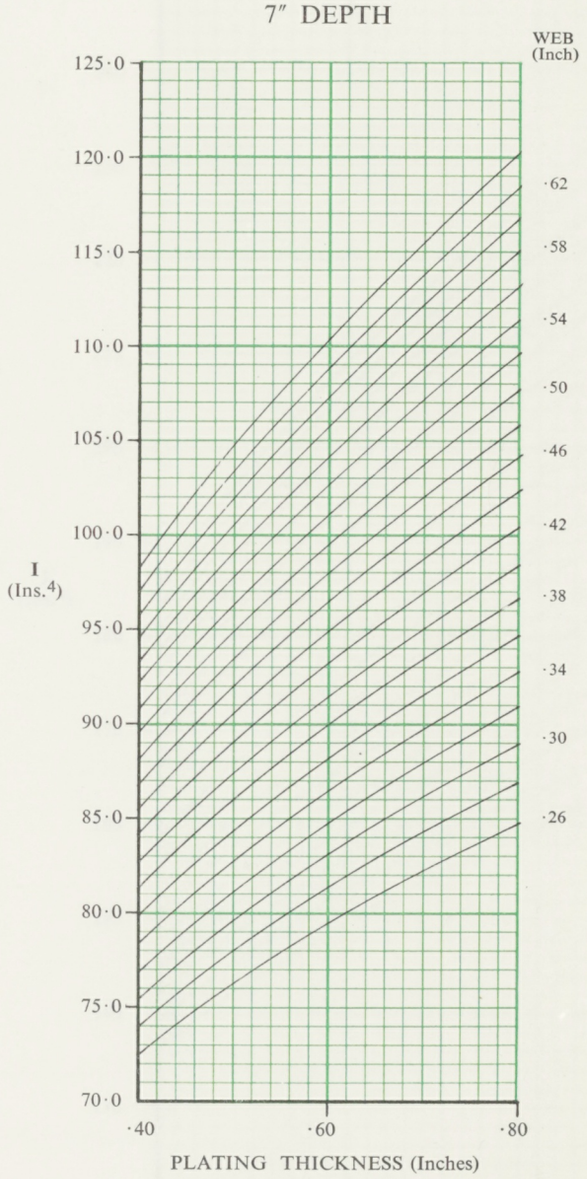


3″ FLANGE

6″ DEPTH

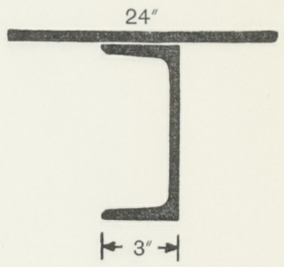


7″ DEPTH



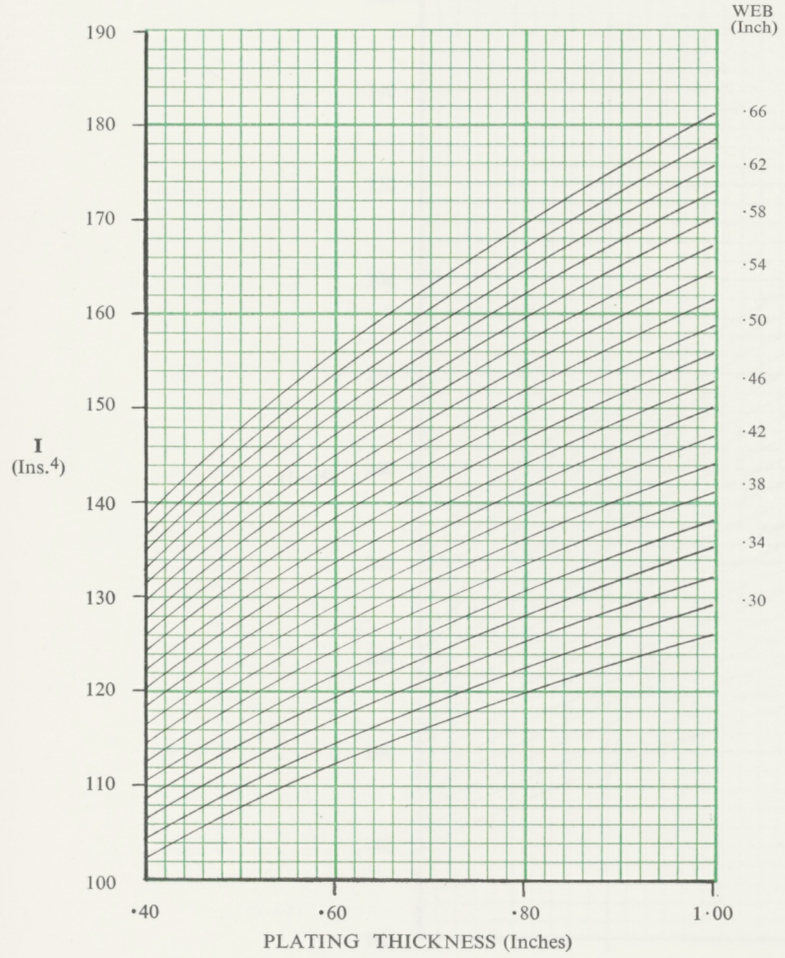
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

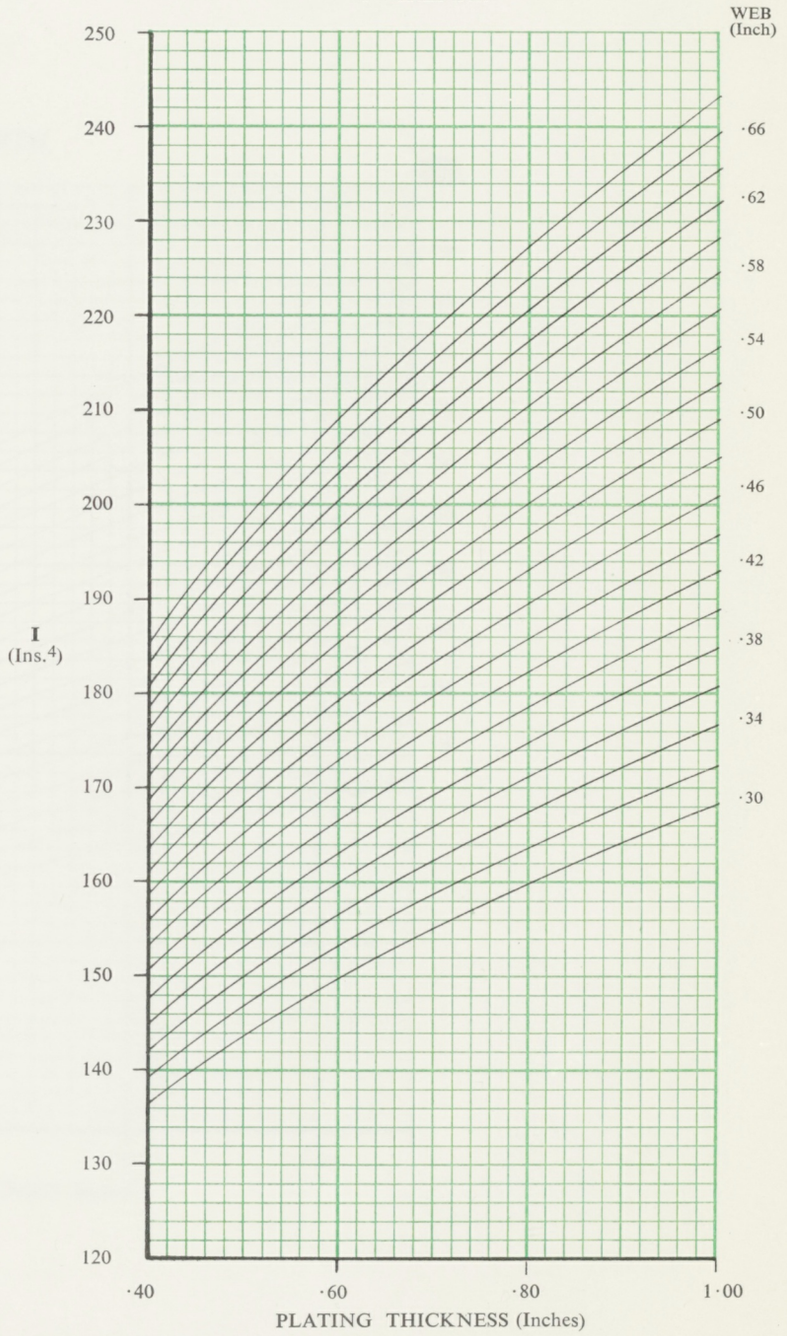


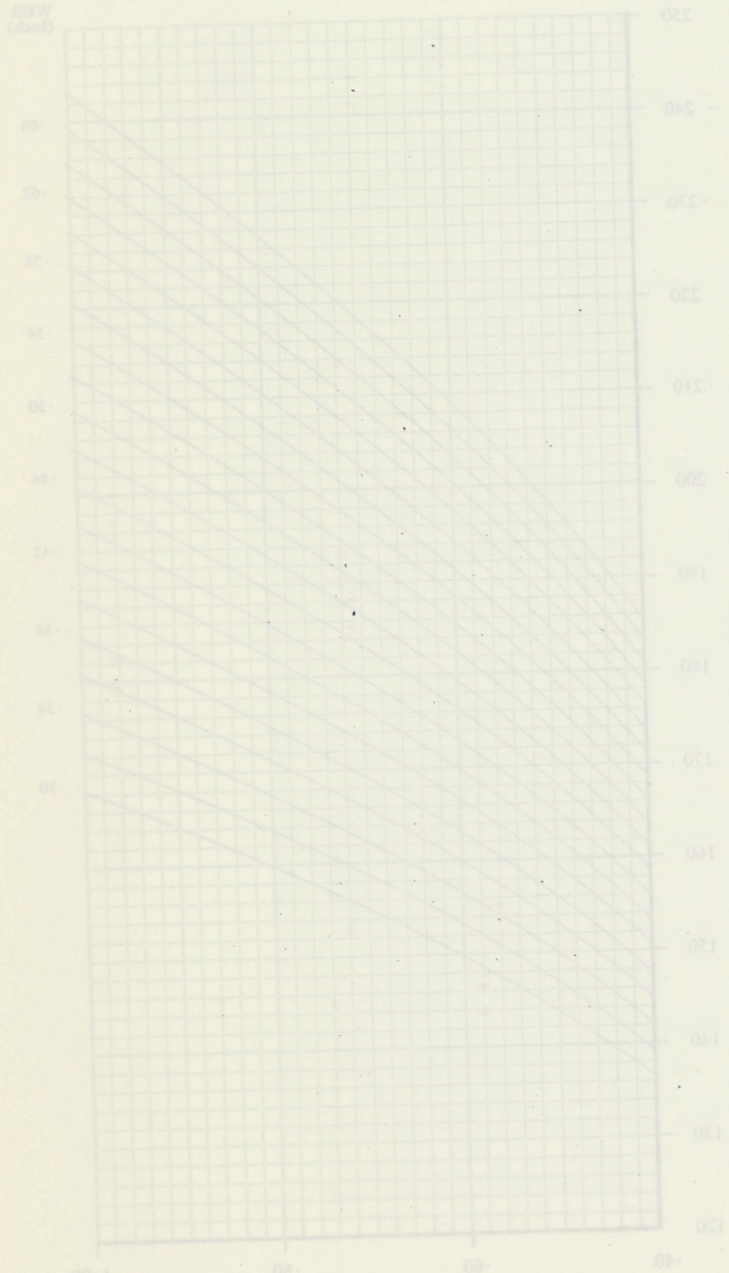
3″ FLANGE

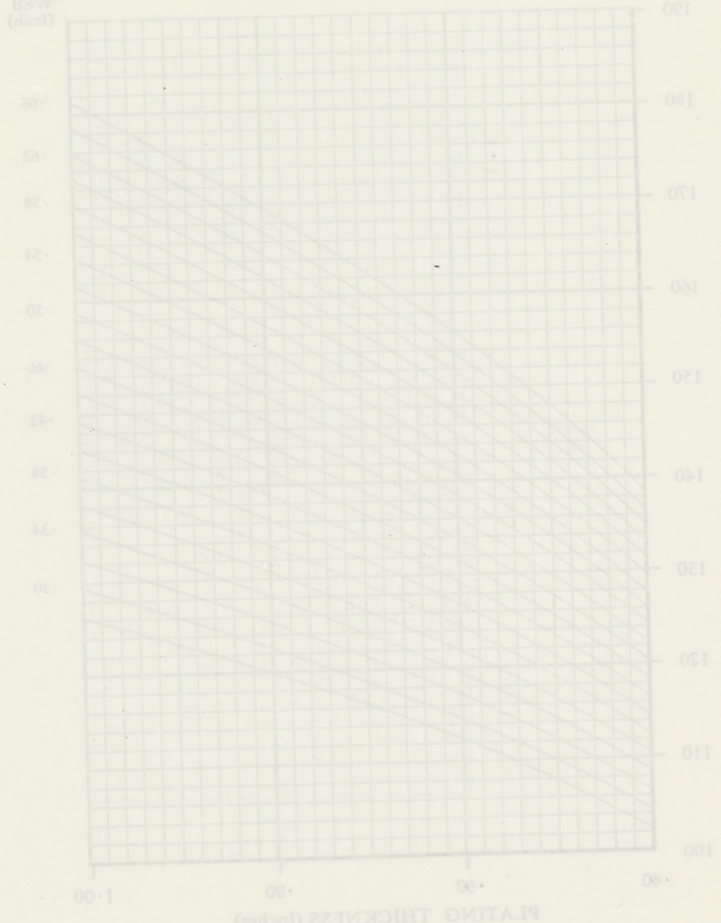
8″ DEPTH



9″ DEPTH

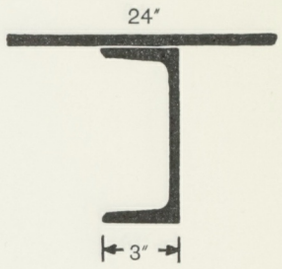



9" DEPTH
PLATING THICKNESS (inches)


PLATING THICKNESS (inches)

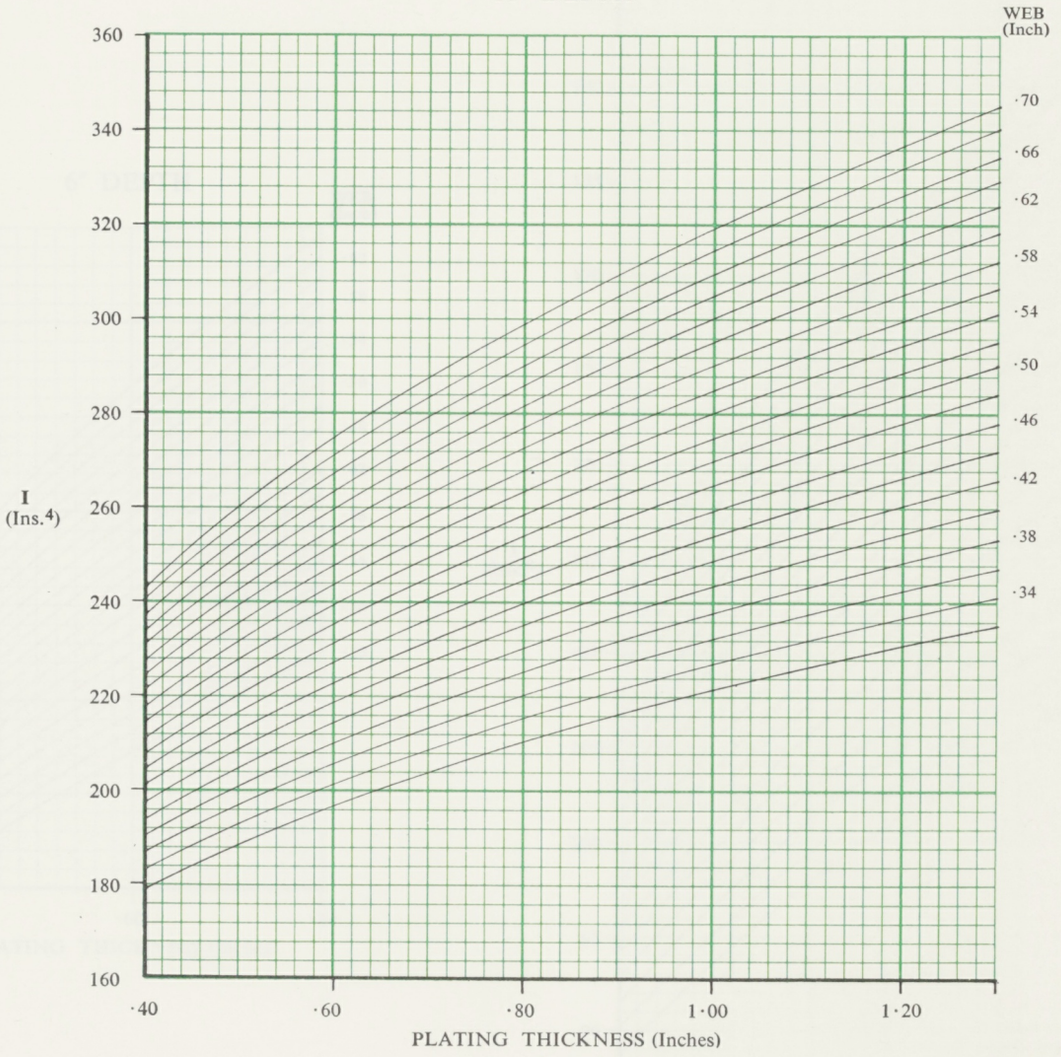
MOMENT OF INERTIA OF CHANNELS

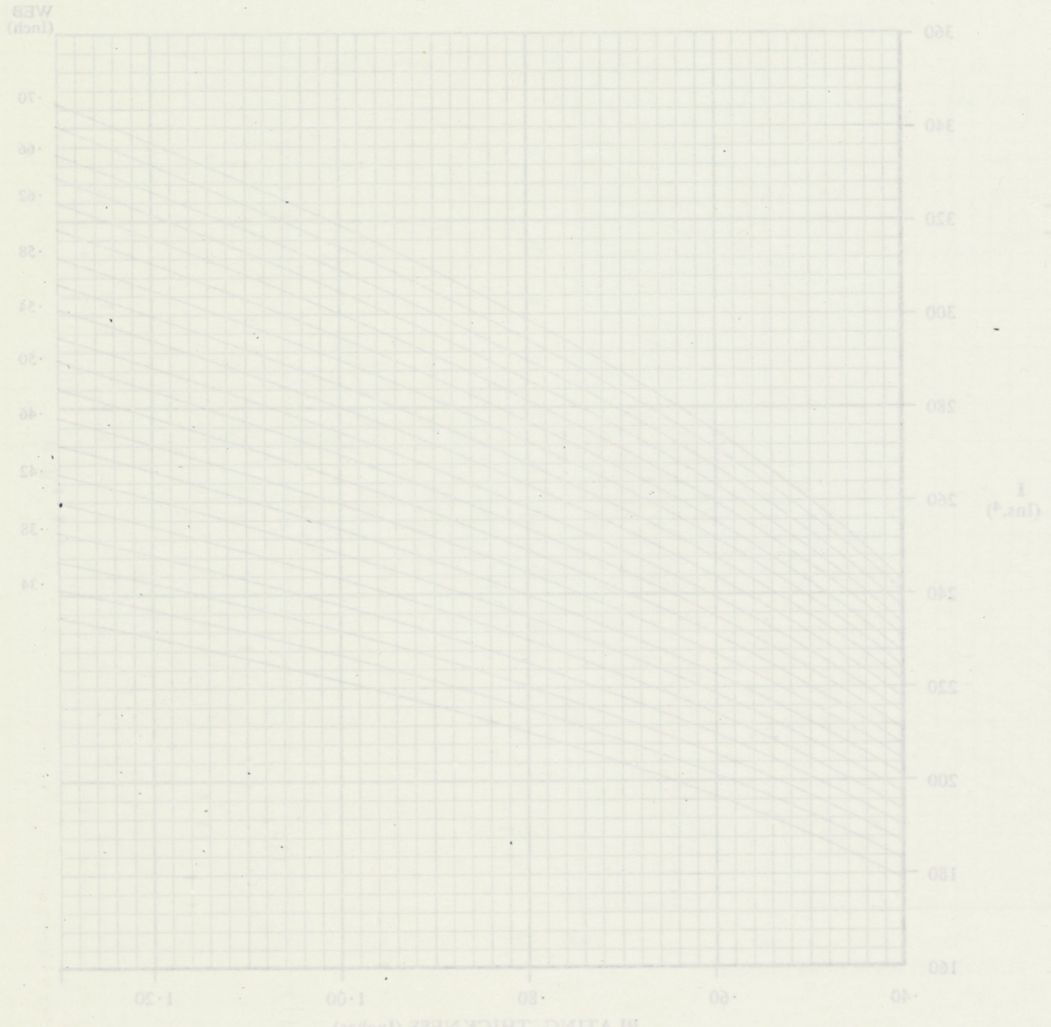
(WITH PLATING)



3″ FLANGE

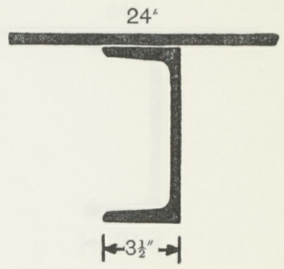
10″ DEPTH





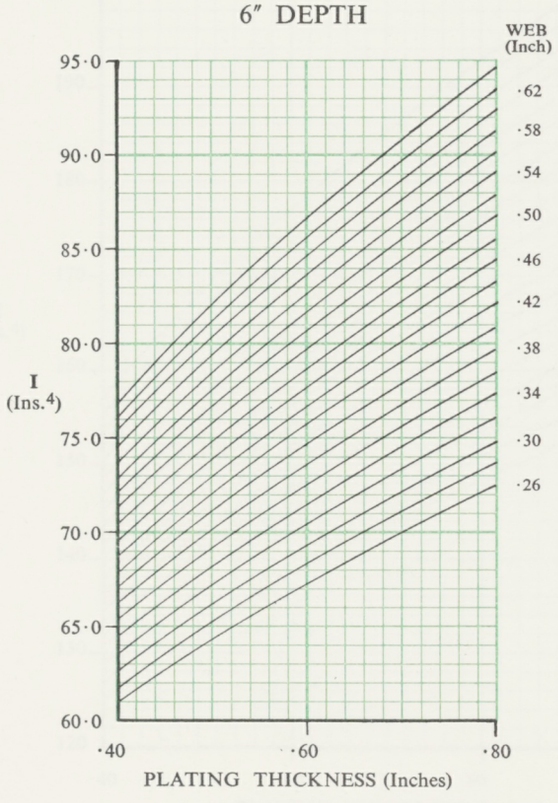
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

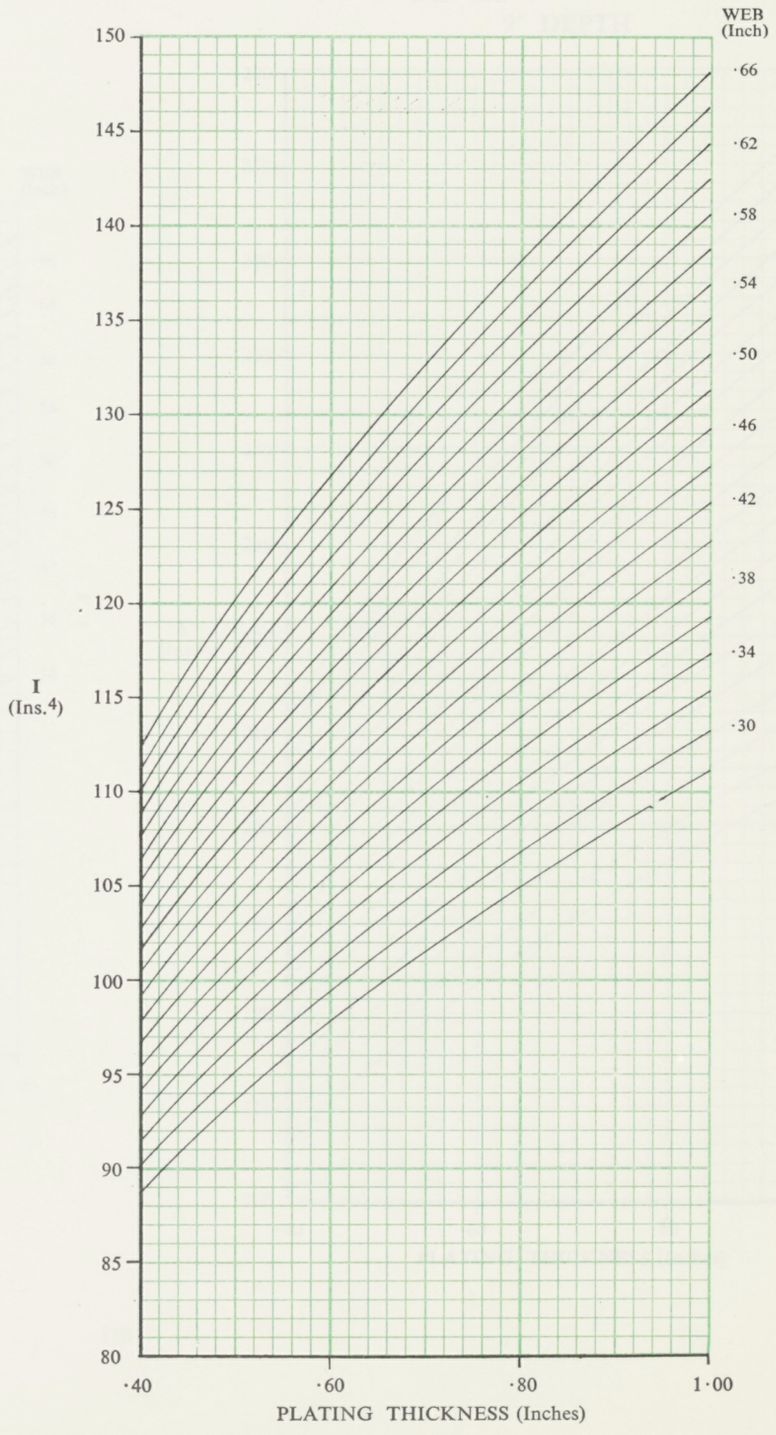


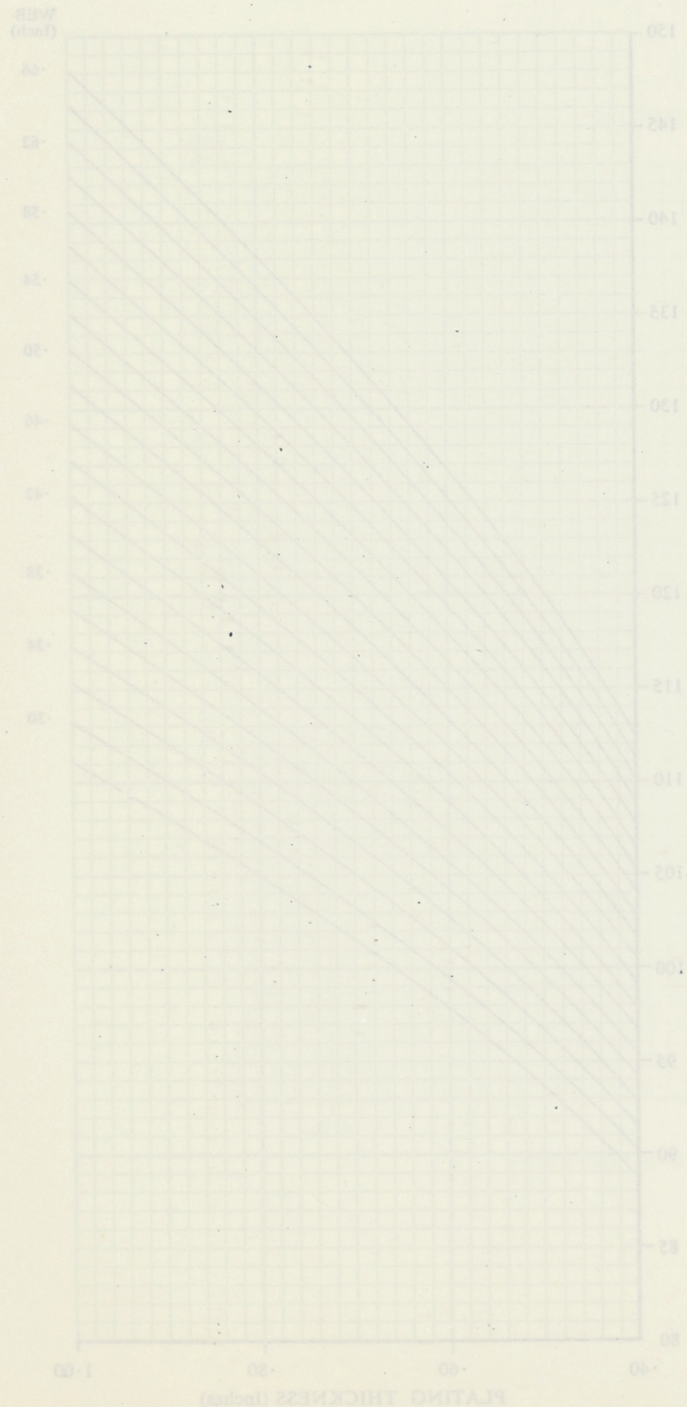
3½″ FLANGE

6″ DEPTH



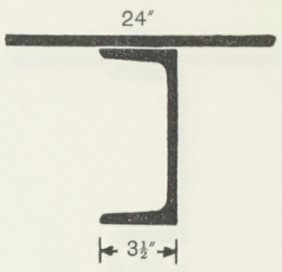
7″ DEPTH





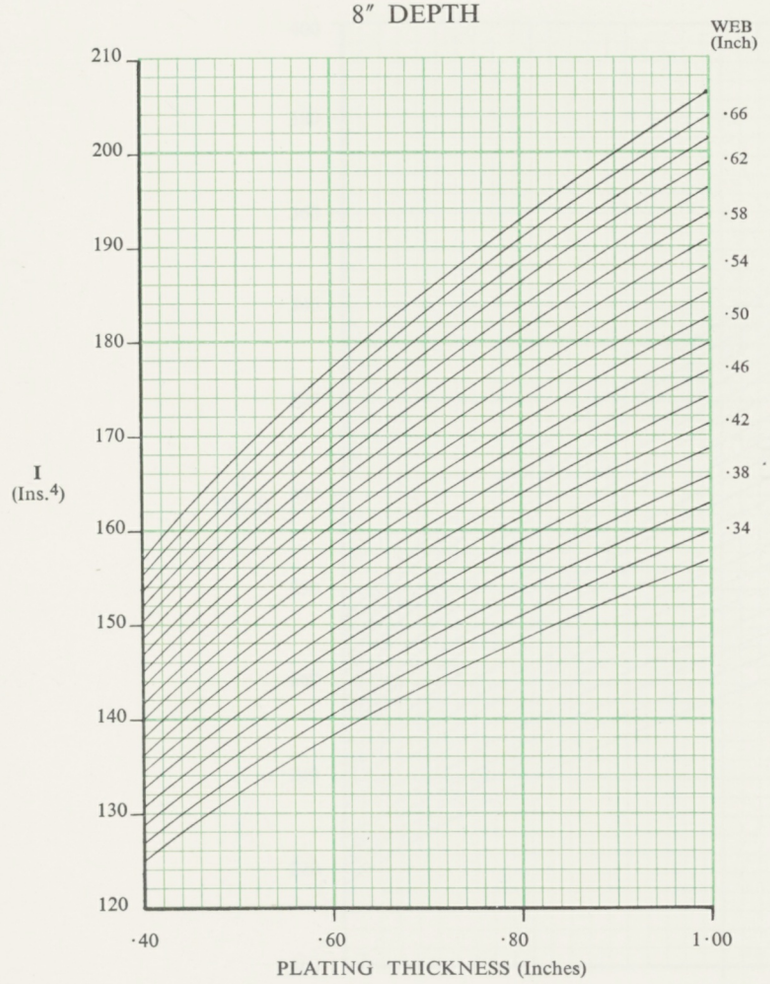
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

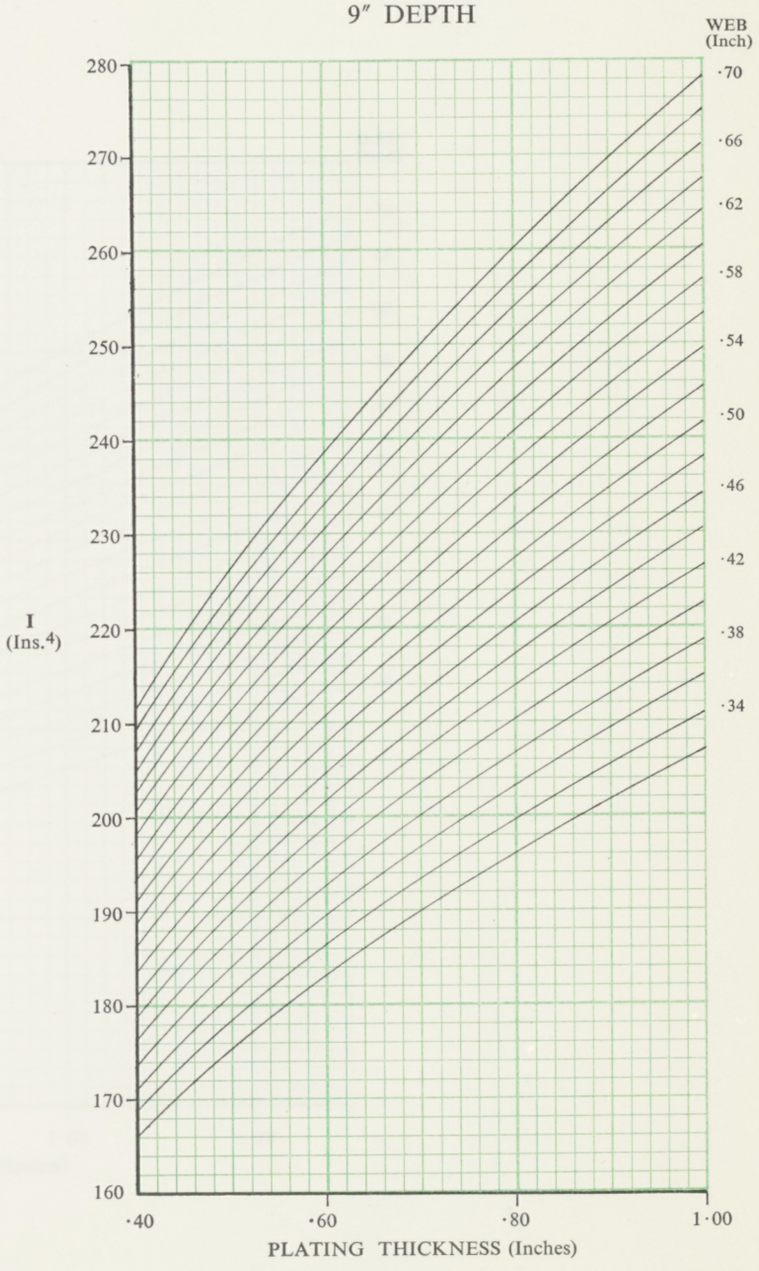


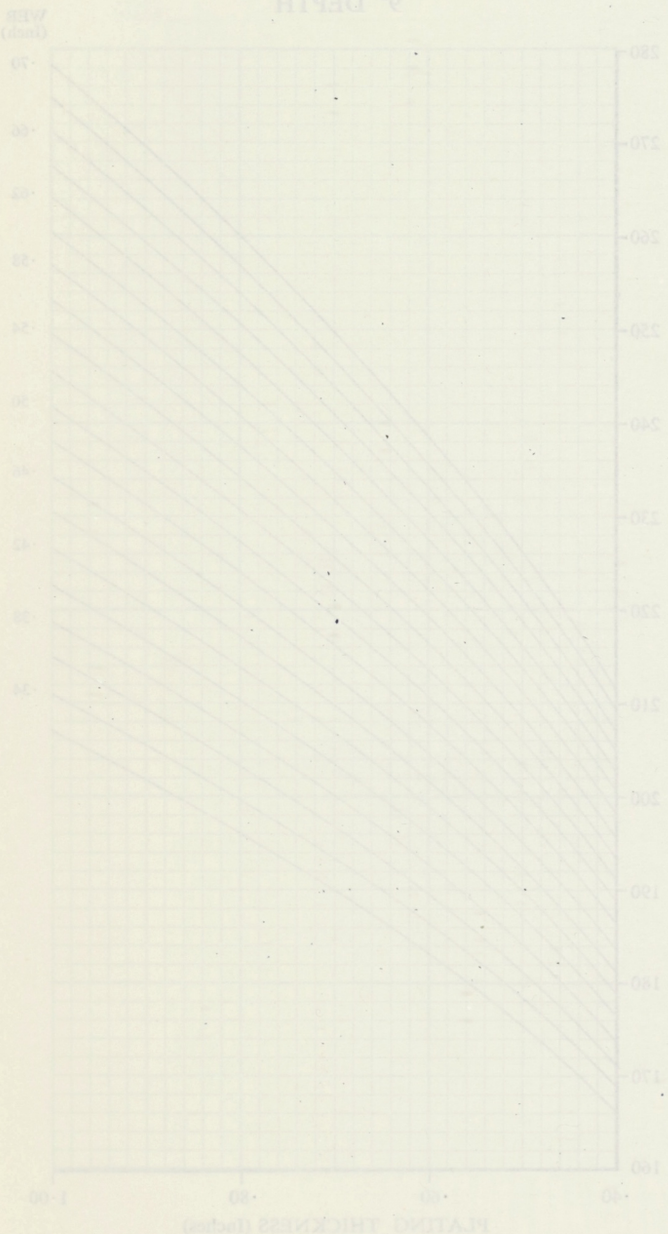
3½″ FLANGE

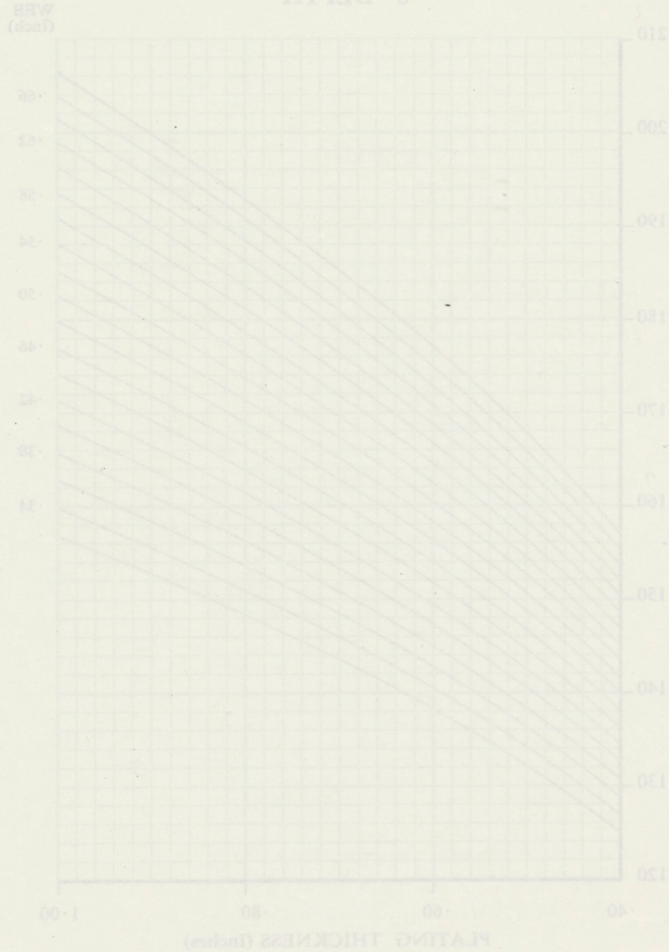
8″ DEPTH



9″ DEPTH

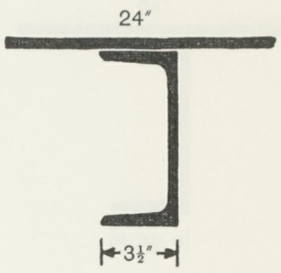






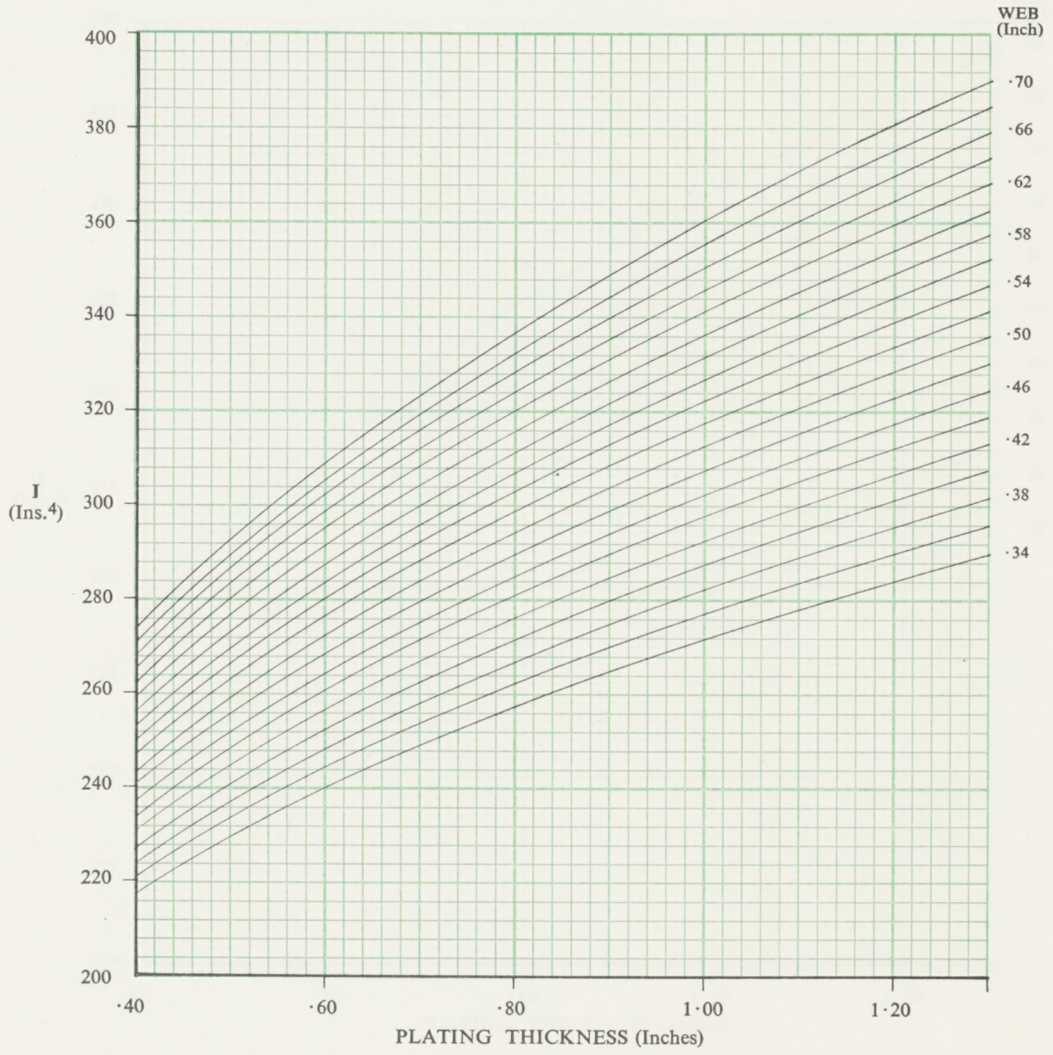
MOMENT OF INERTIA OF CHANNELS

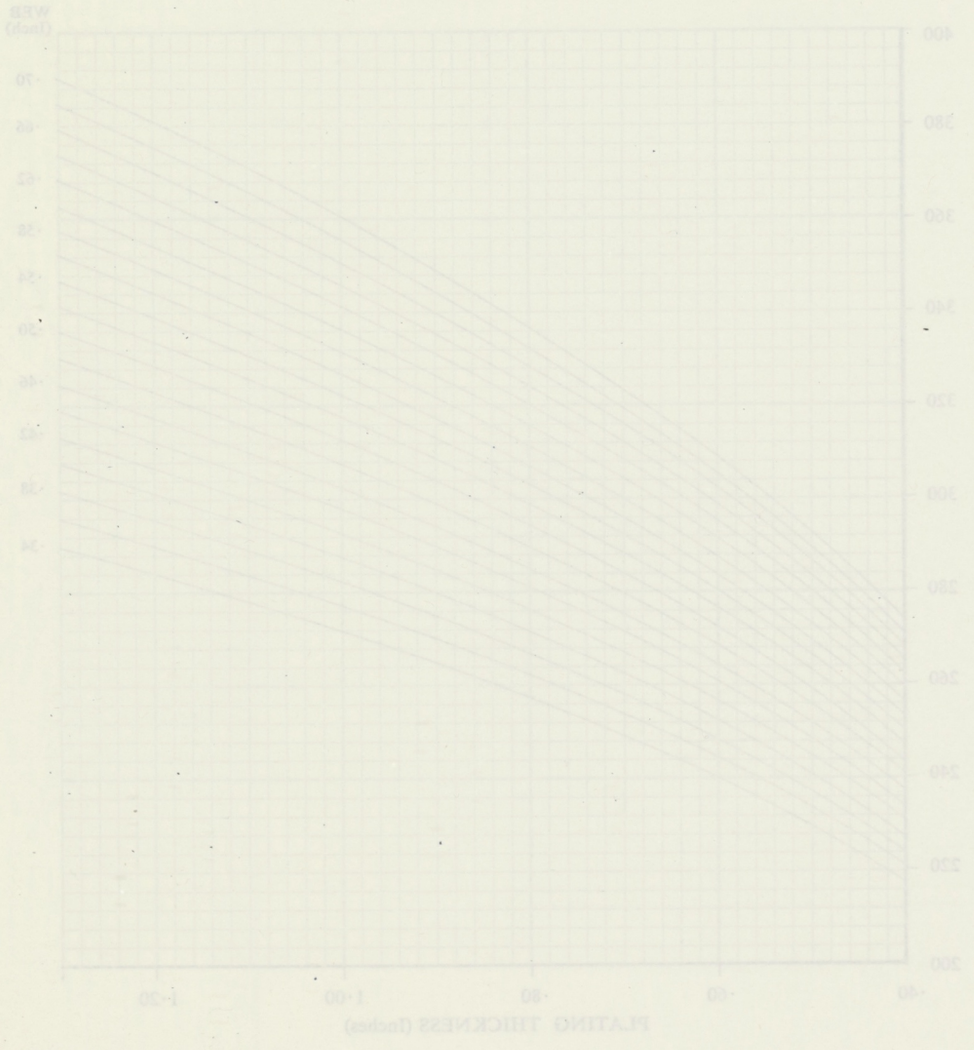
(WITH PLATING)



3½″ FLANGE

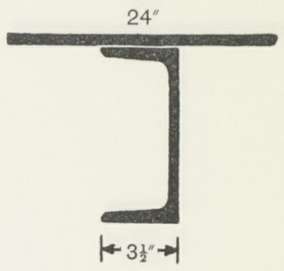
10″ DEPTH





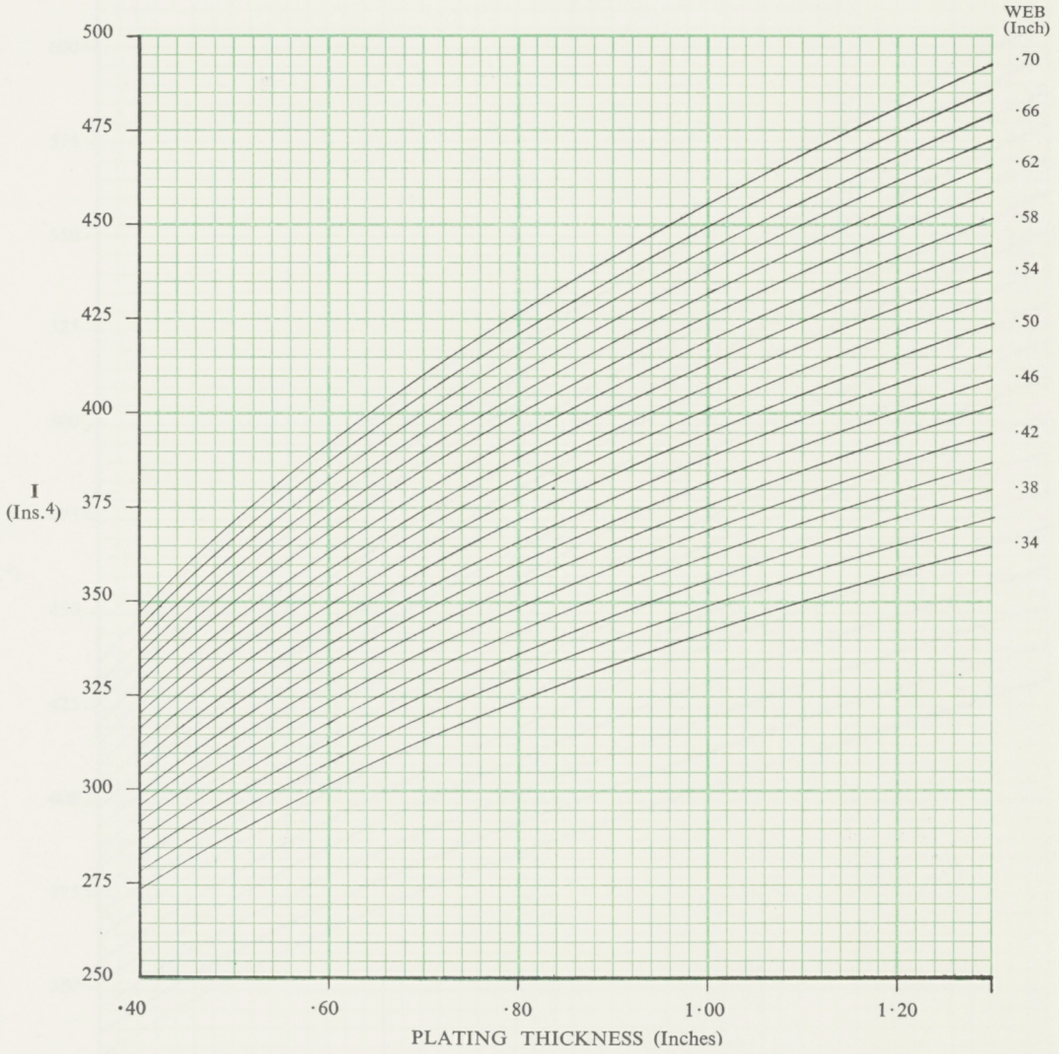
MOMENT OF INERTIA OF CHANNELS

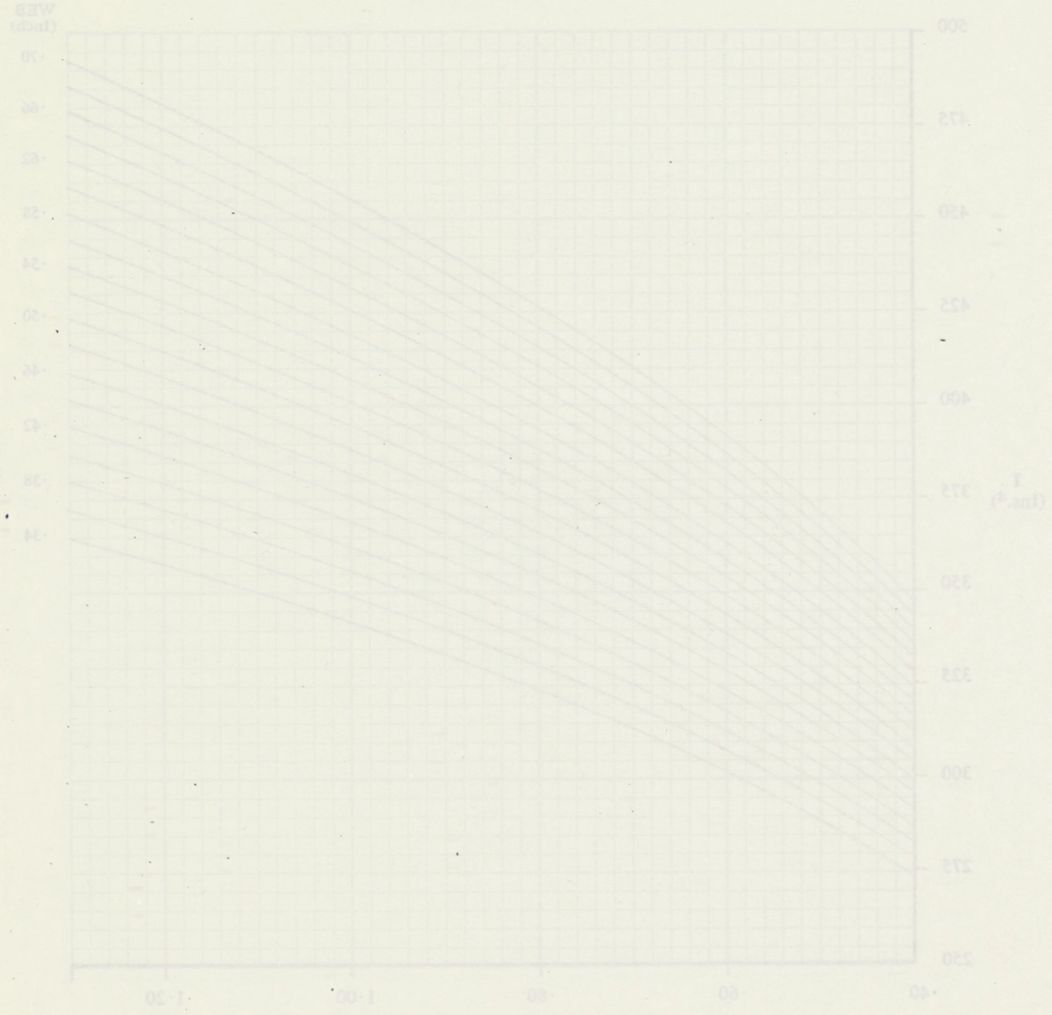
(WITH PLATING)



3½″ FLANGE

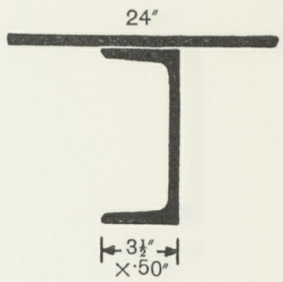
11″ DEPTH





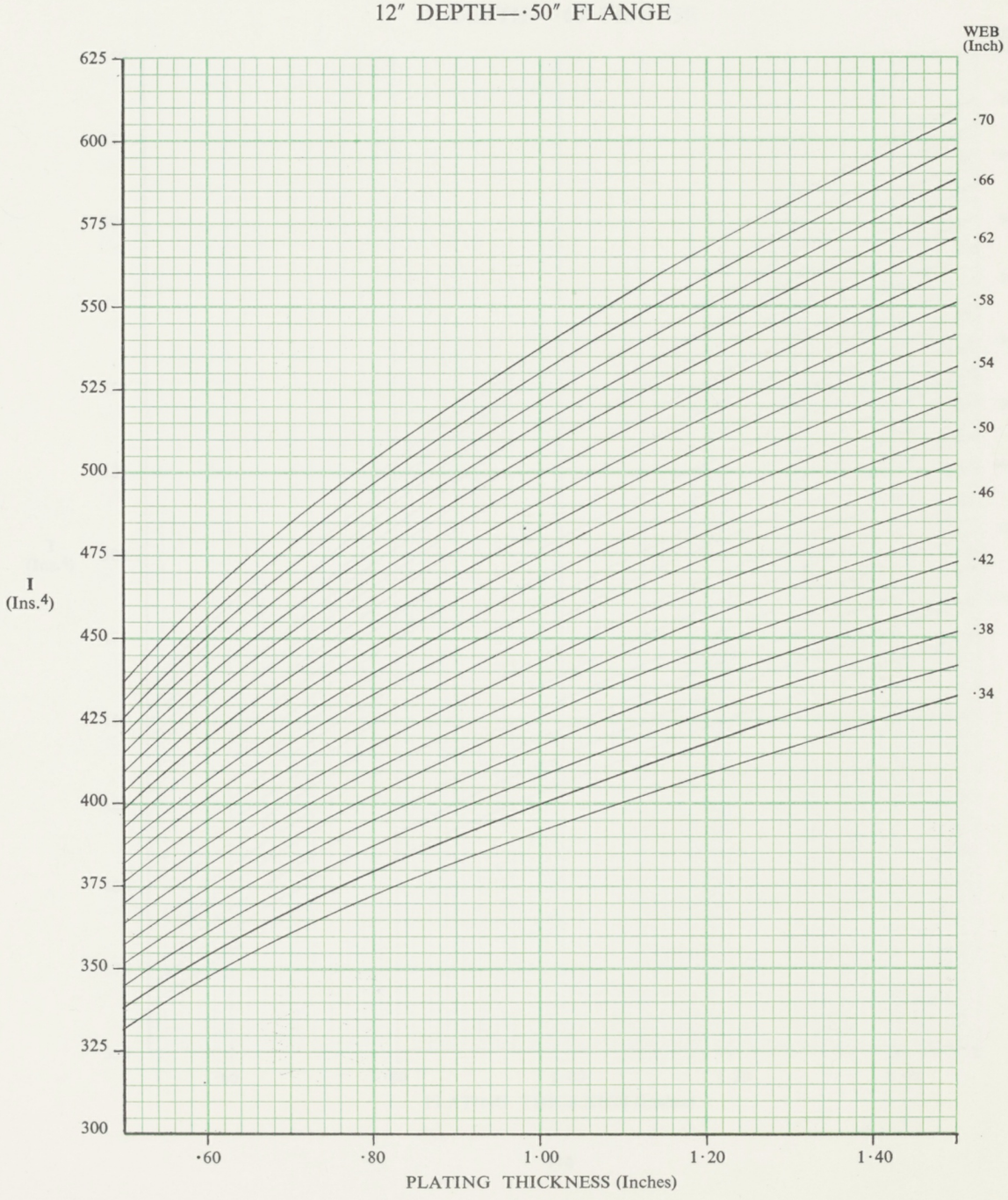
MOMENT OF INERTIA OF CHANNELS

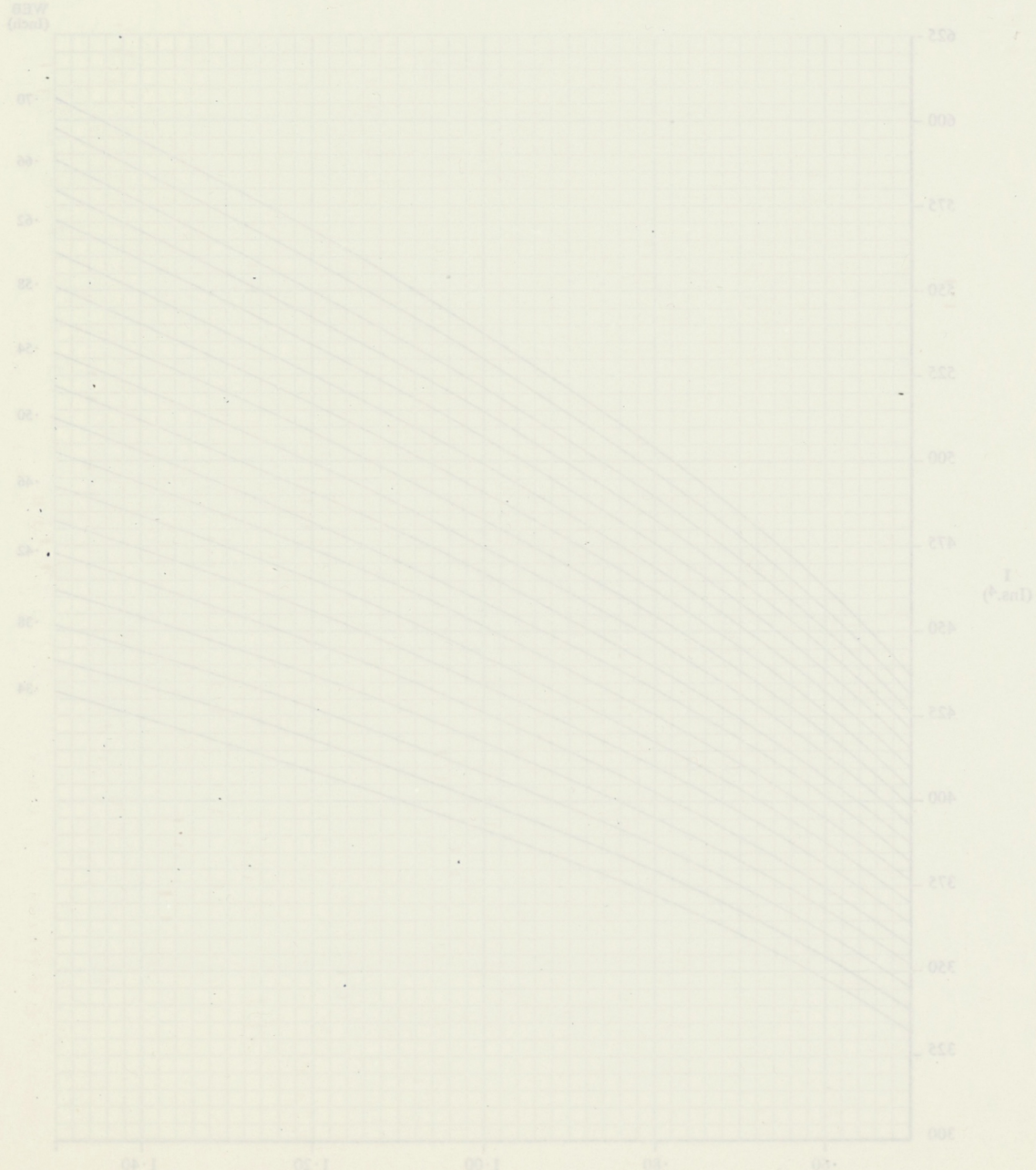
(WITH PLATING)



3½″ FLANGE

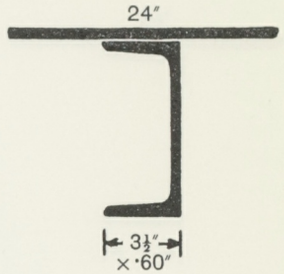
12″ DEPTH—·50″ FLANGE





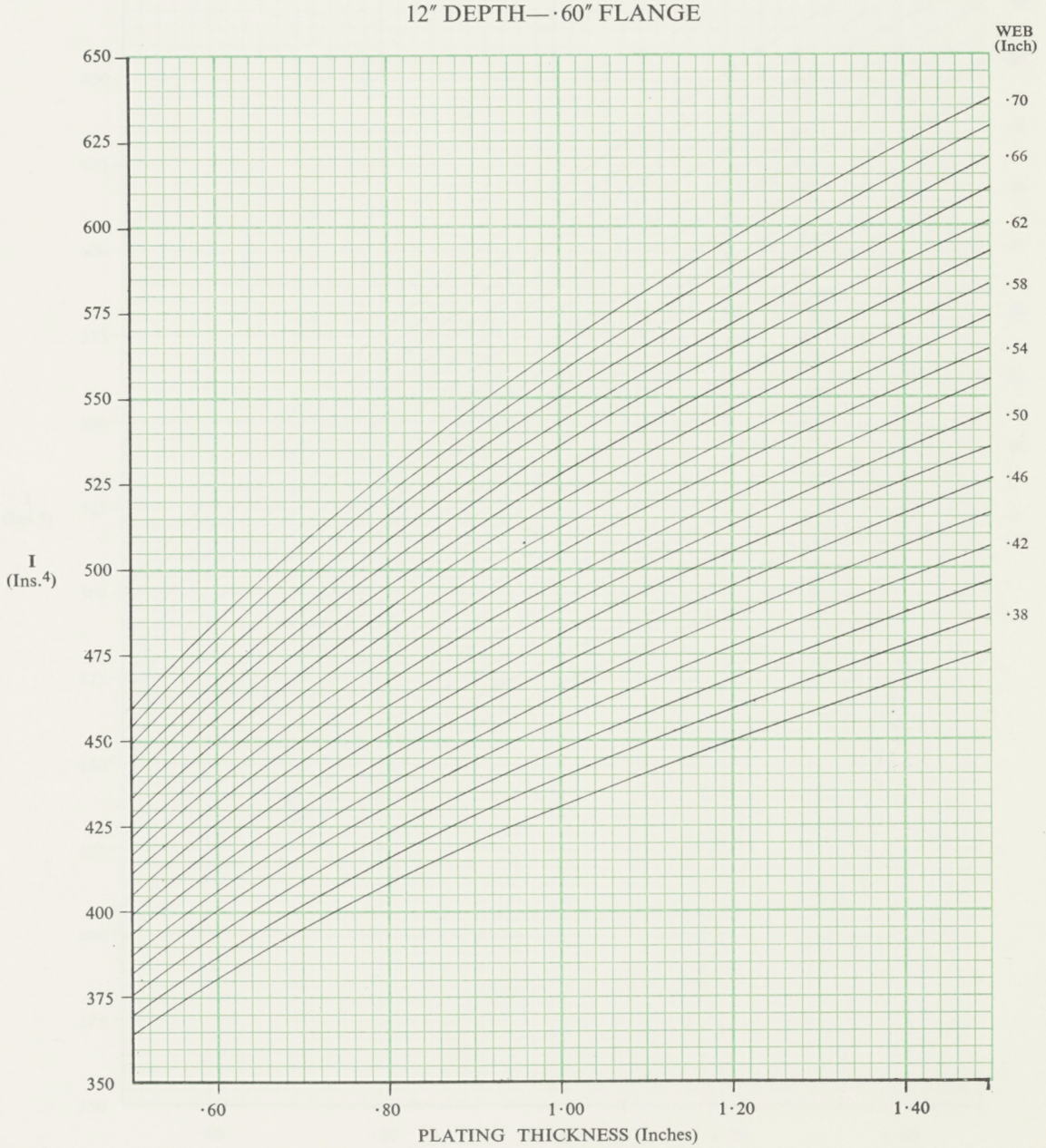
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



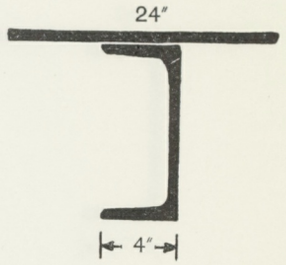
3½″ FLANGE

12″ DEPTH—·60″ FLANGE



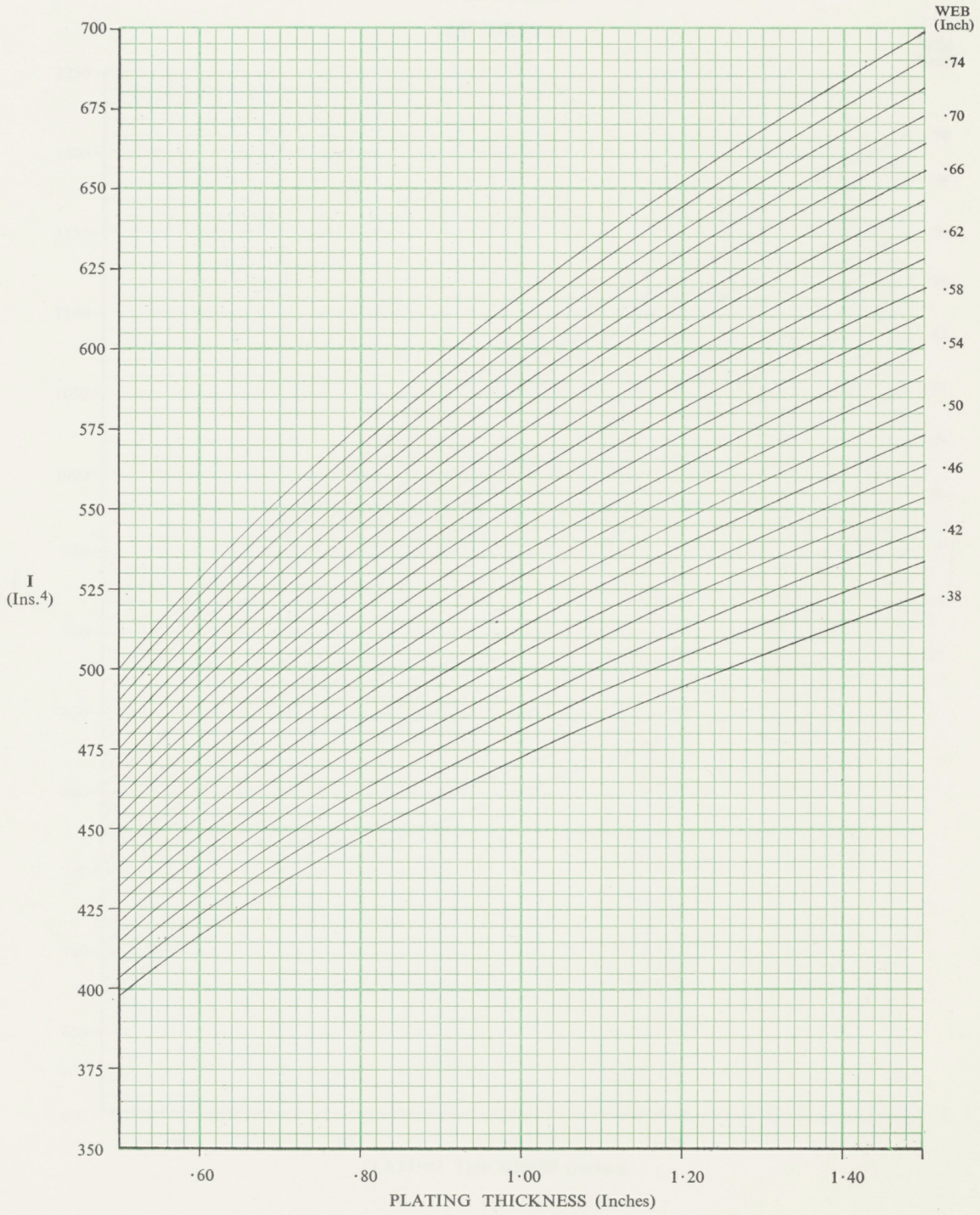
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



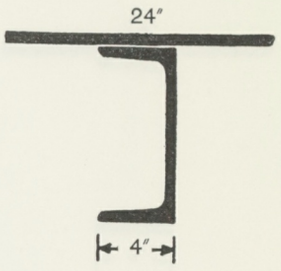
4″ FLANGE

12″ DEPTH



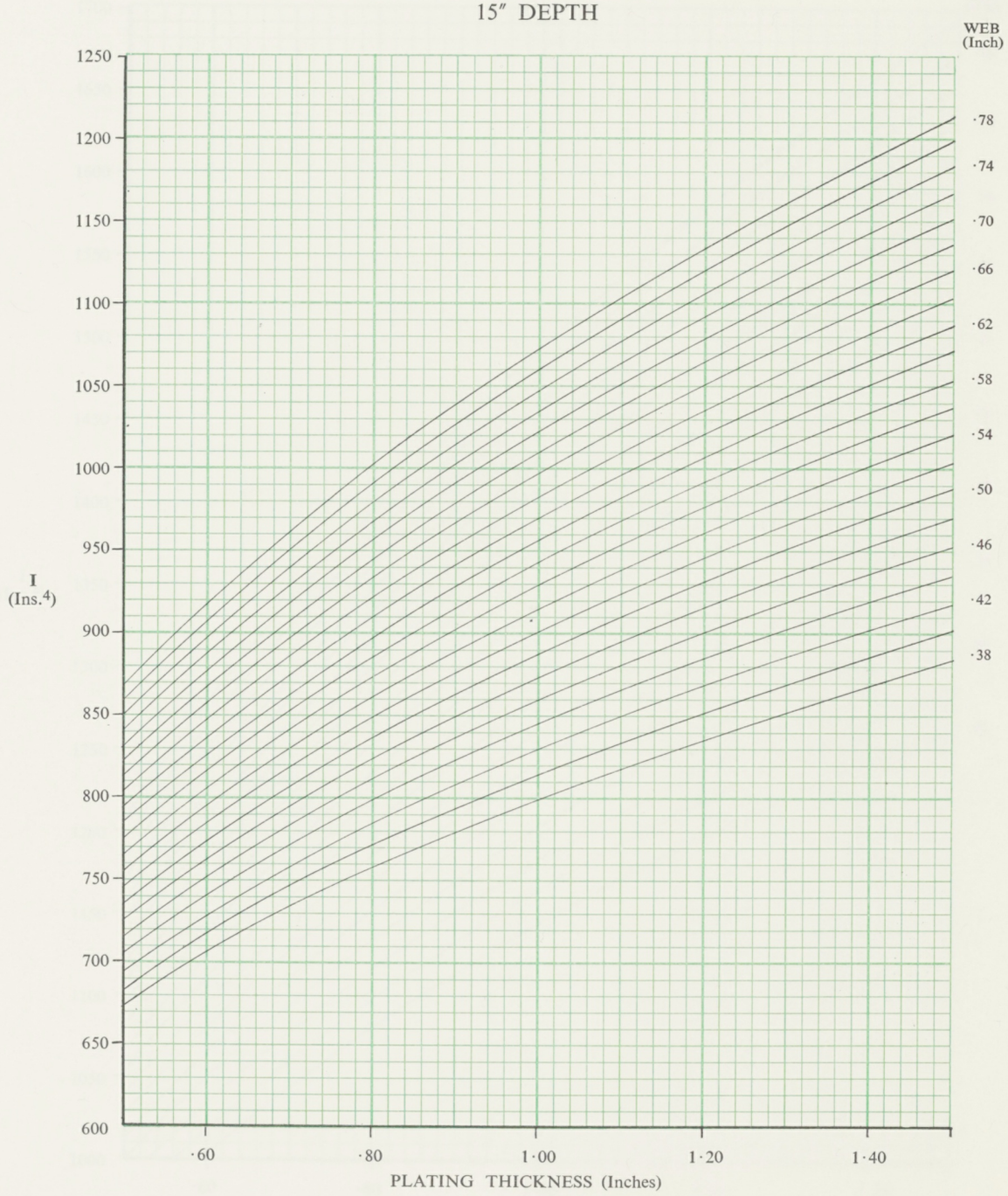
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



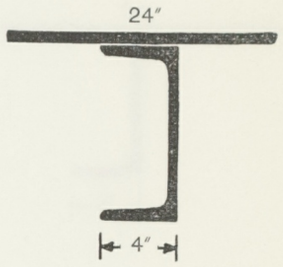
4″ FLANGE

15″ DEPTH



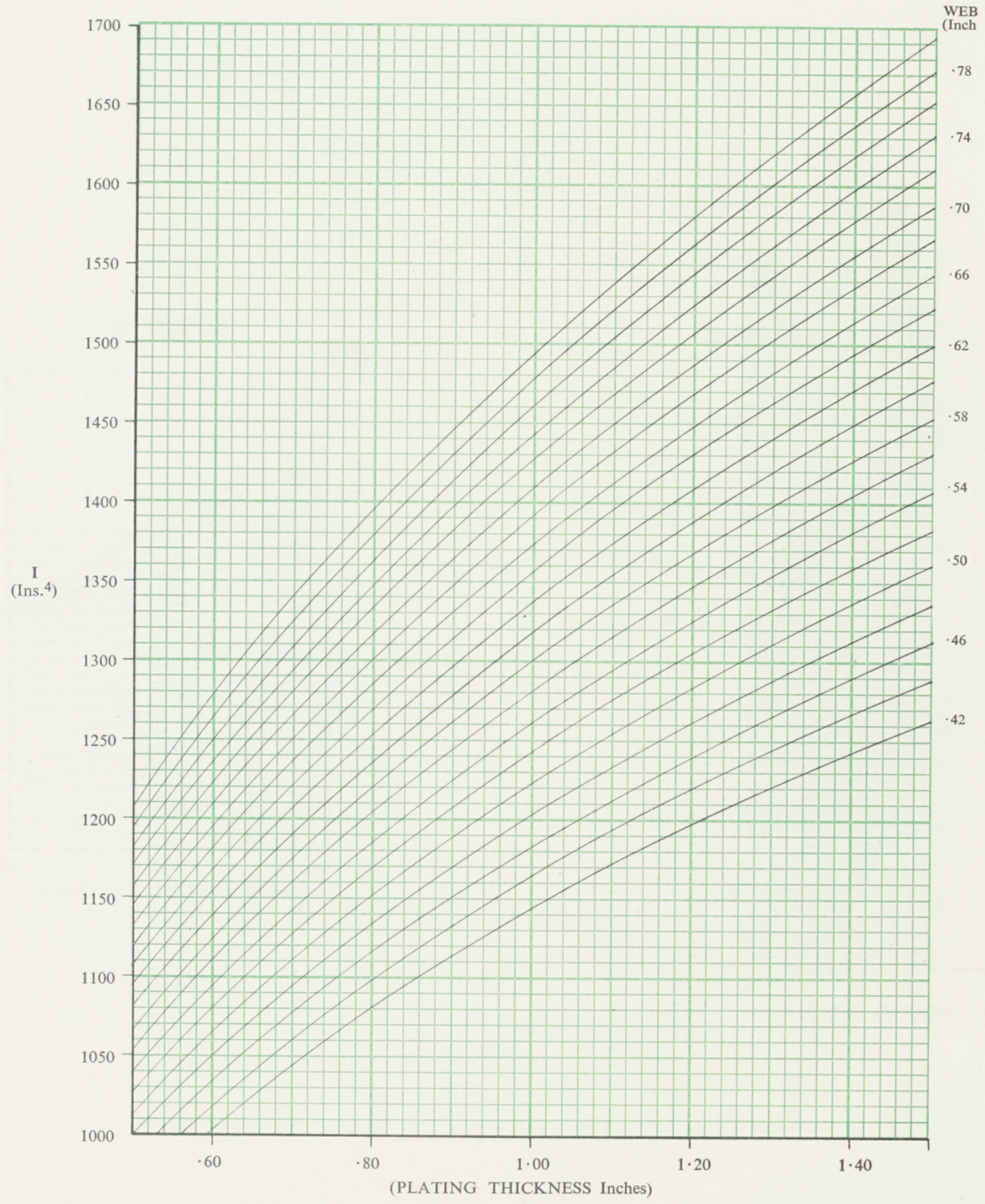
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



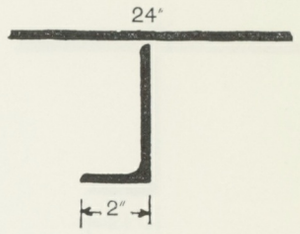
4″ FLANGE

17″ DEPTH



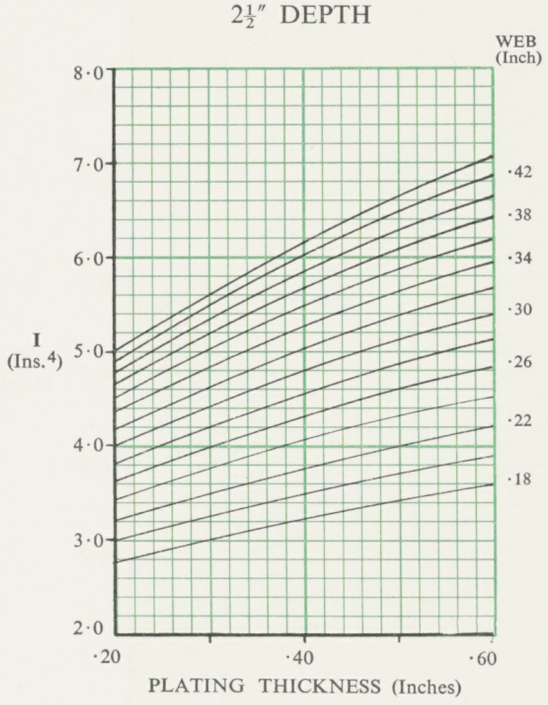
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

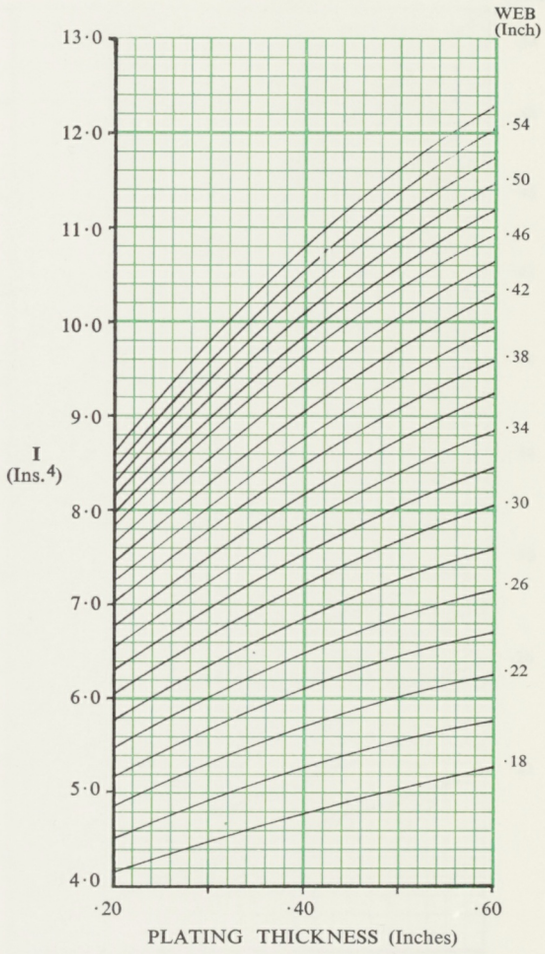


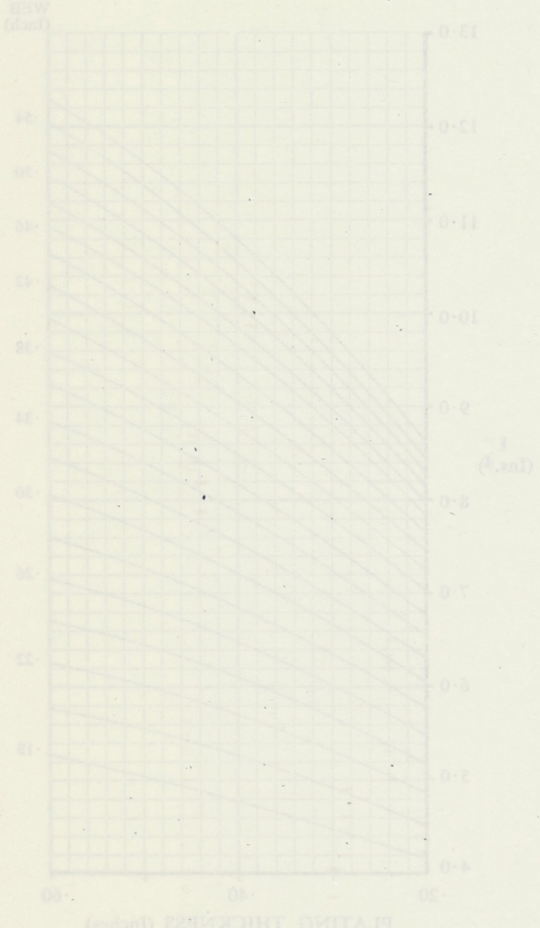
2″ FLANGE

2½″ DEPTH



3″ DEPTH




WEB
(Inch)
19·0
12·0
11·0
10·0
9·0
8·0
7·0
6·0
5·0
4·0
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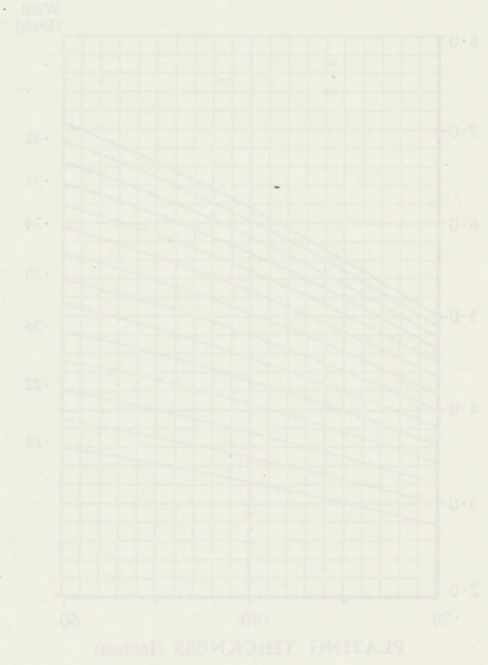
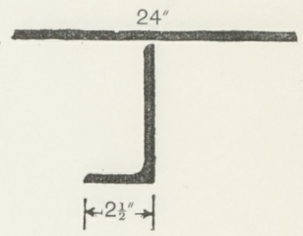
(Inch)
60
40
20
PLATING THICKNESS (Inches)


WEB
(Inch)
8·0
7·0
6·0
5·0
4·0
3·0
2·0
L
(Inch)
60
40
20
PLATING THICKNESS (Inches)

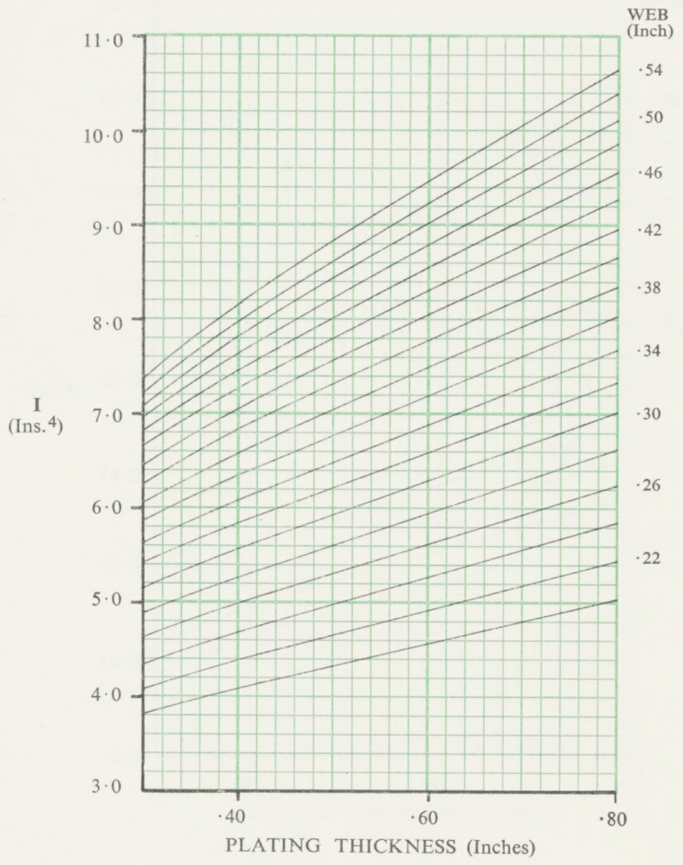
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

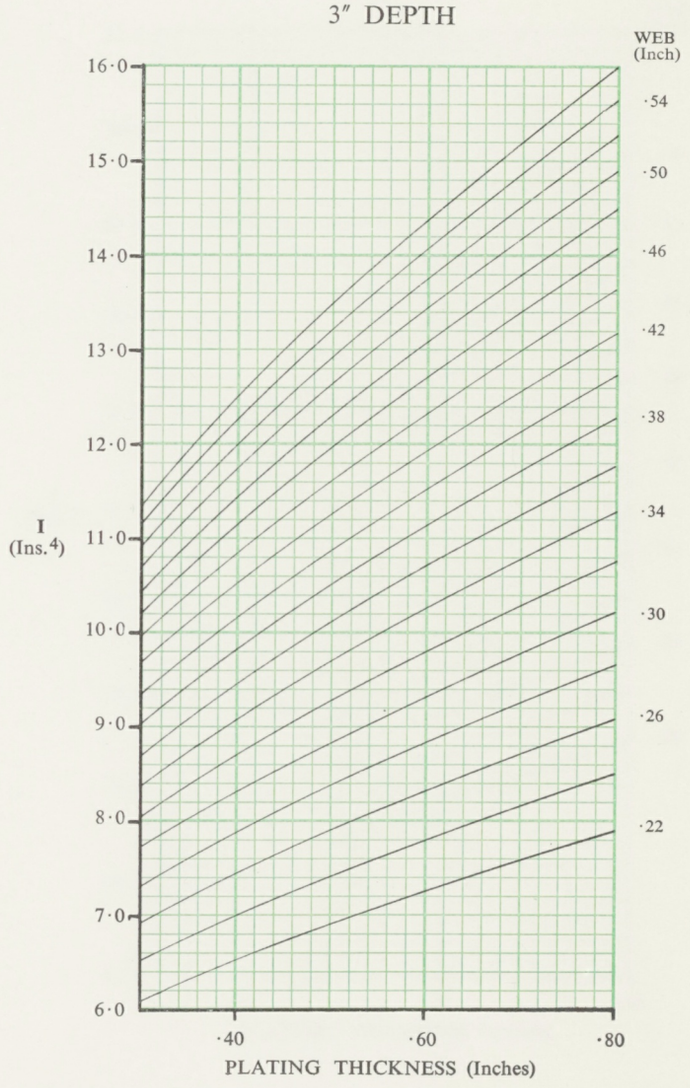


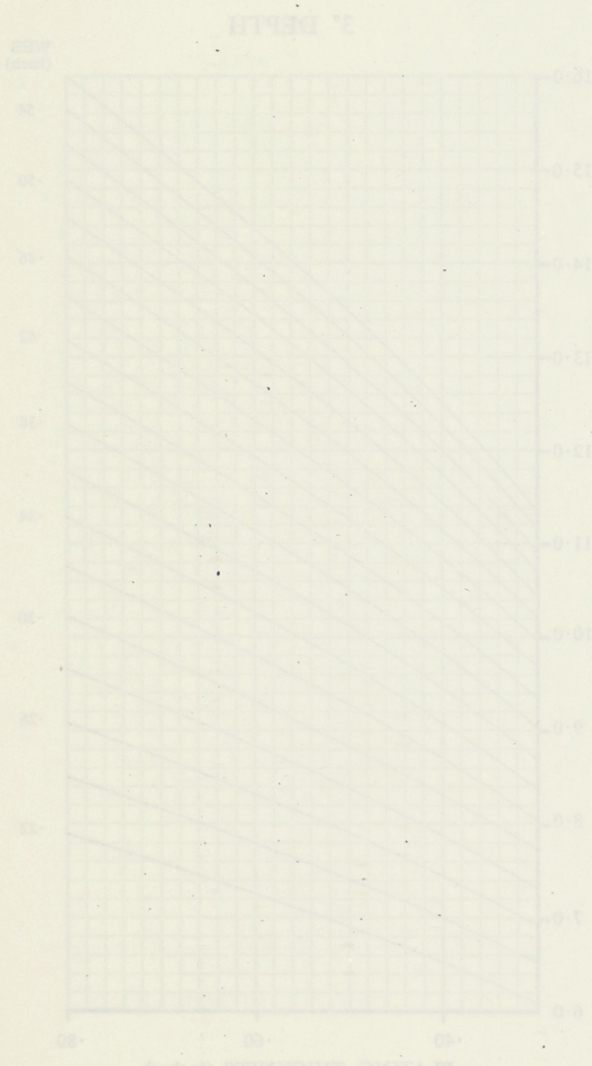
2½″ FLANGE

2½″ DEPTH



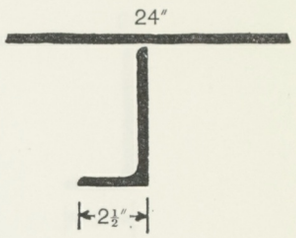
3″ DEPTH





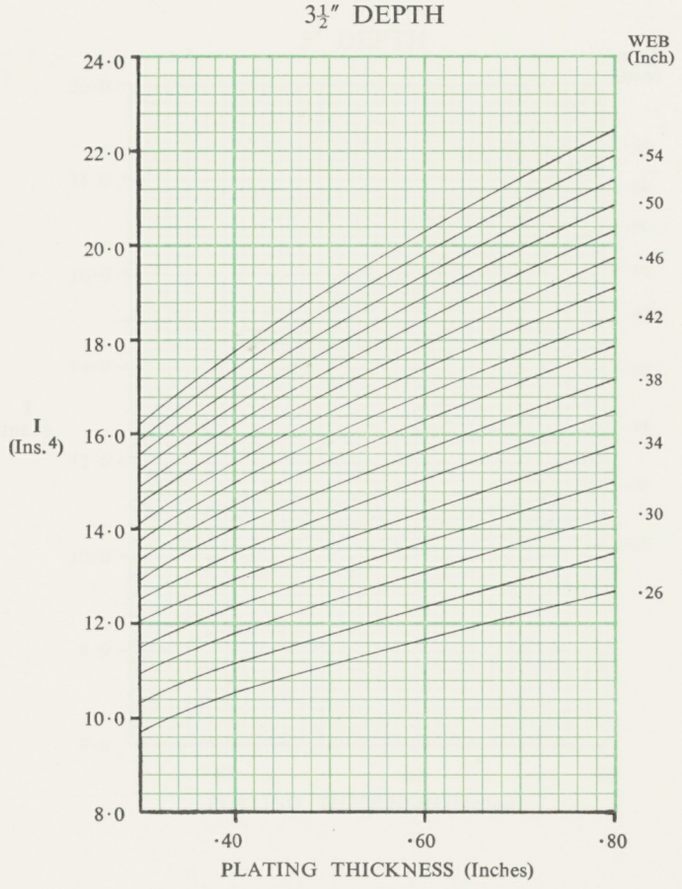
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

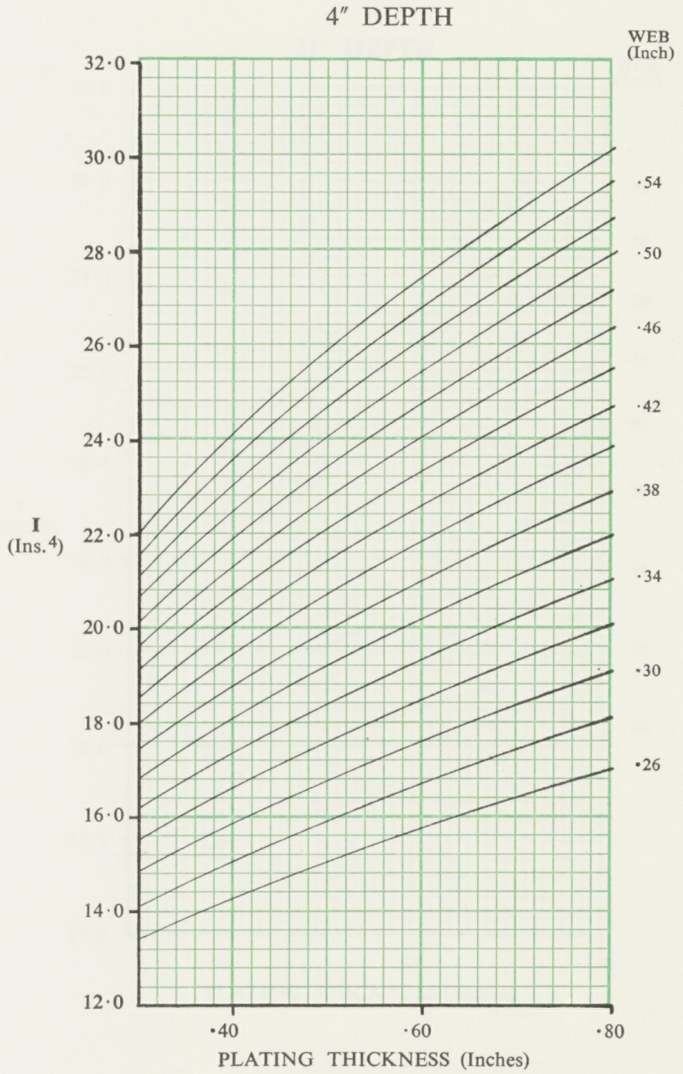


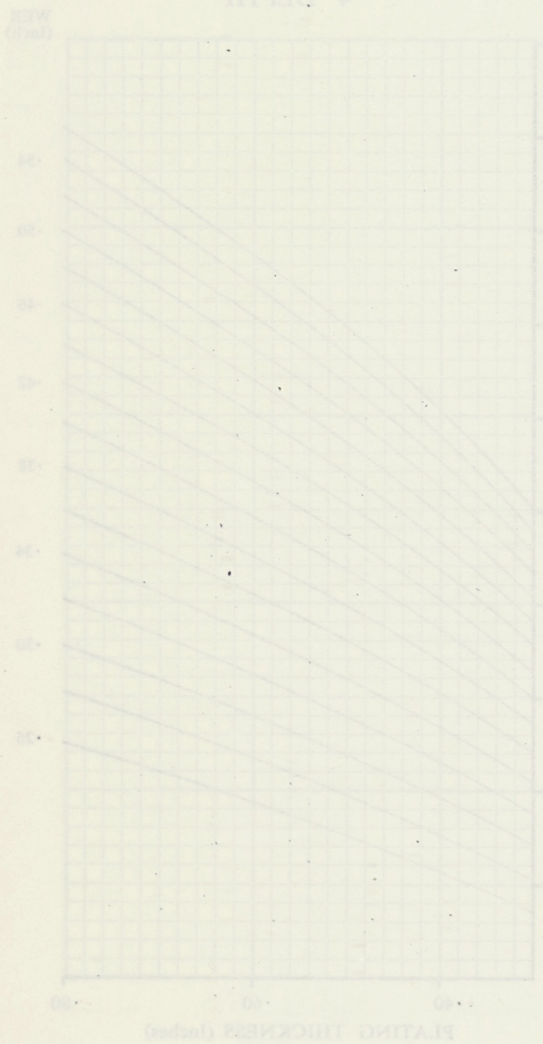
2½″ FLANGE

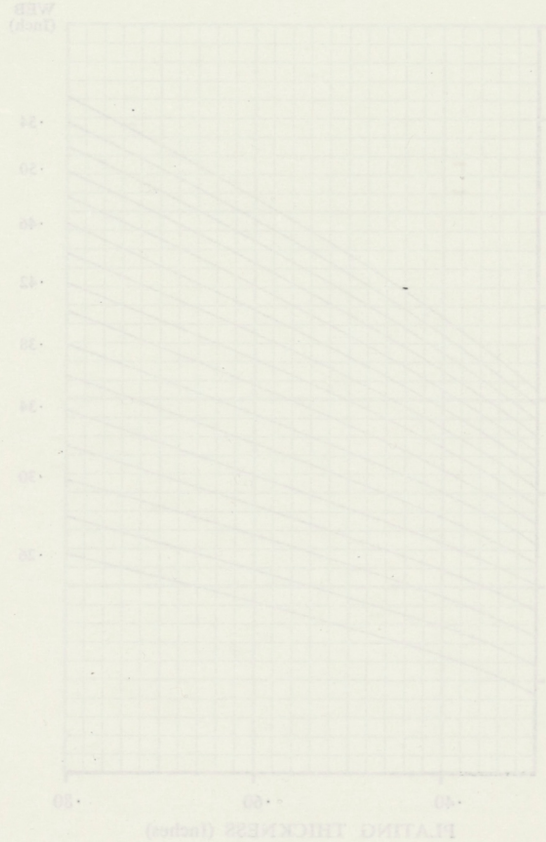
3½″ DEPTH



4″ DEPTH

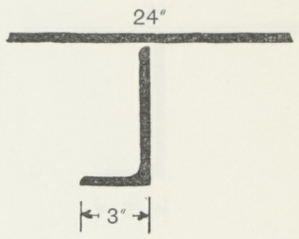






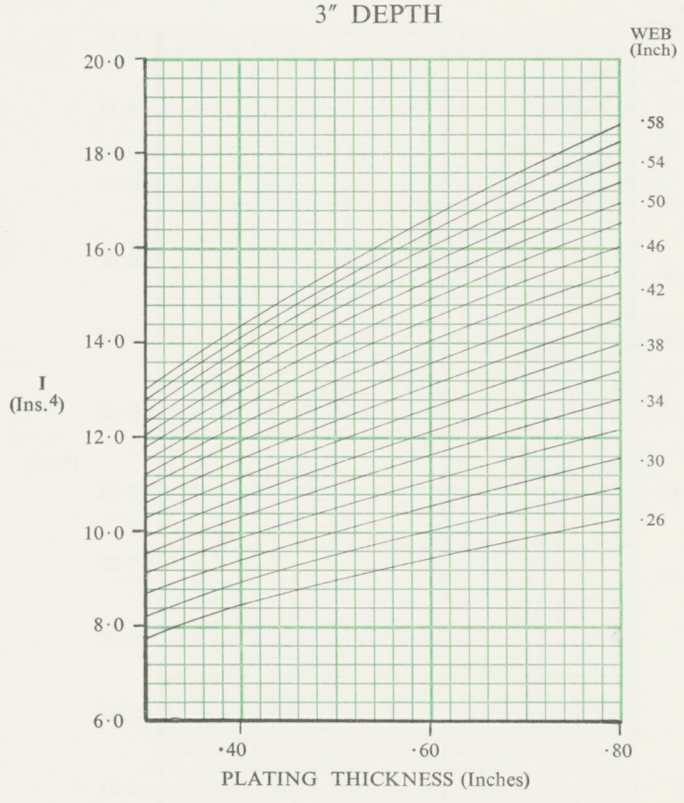
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

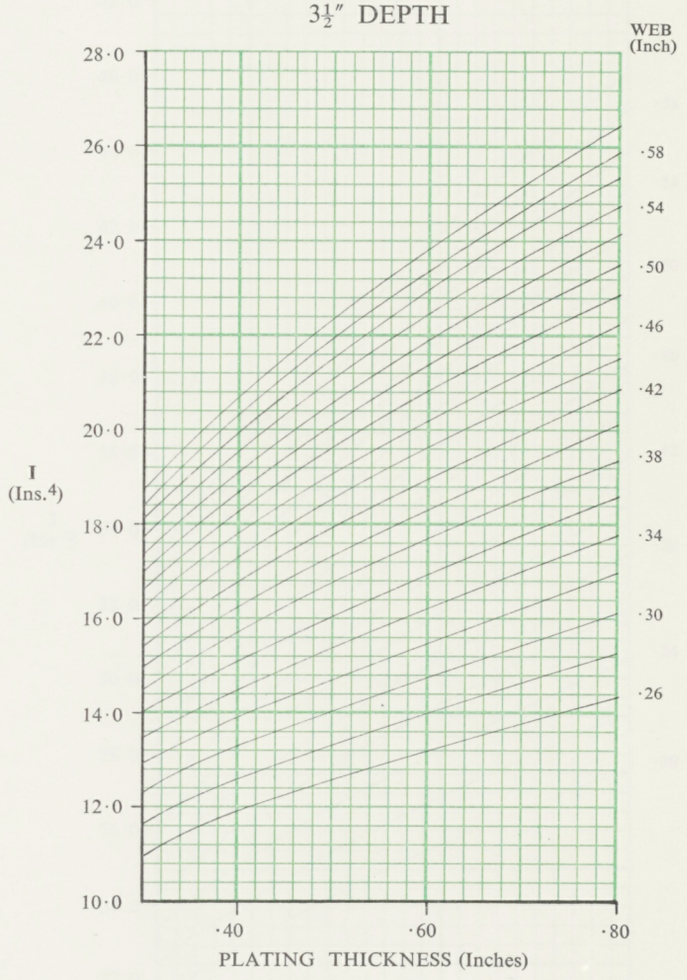


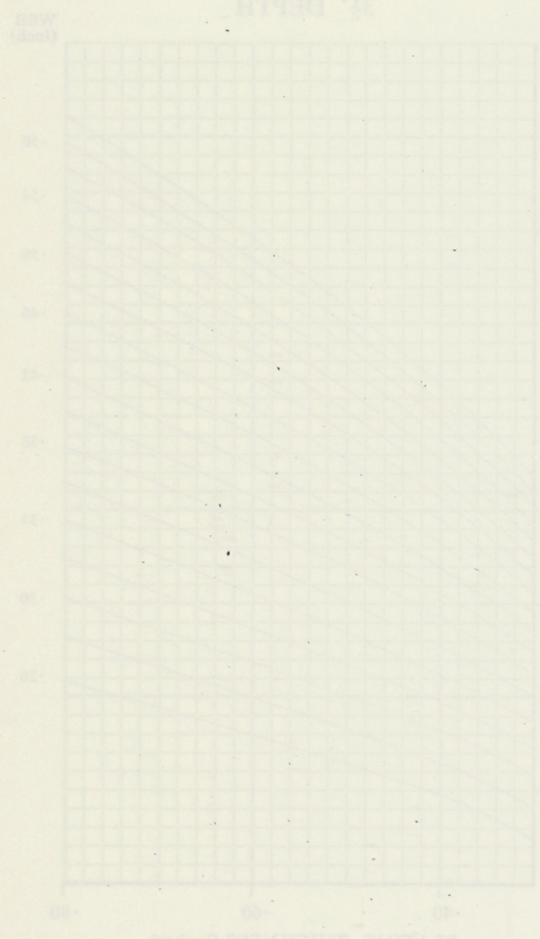
3″ FLANGE

3″ DEPTH



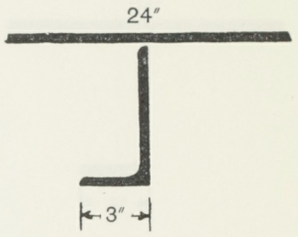
3½″ DEPTH





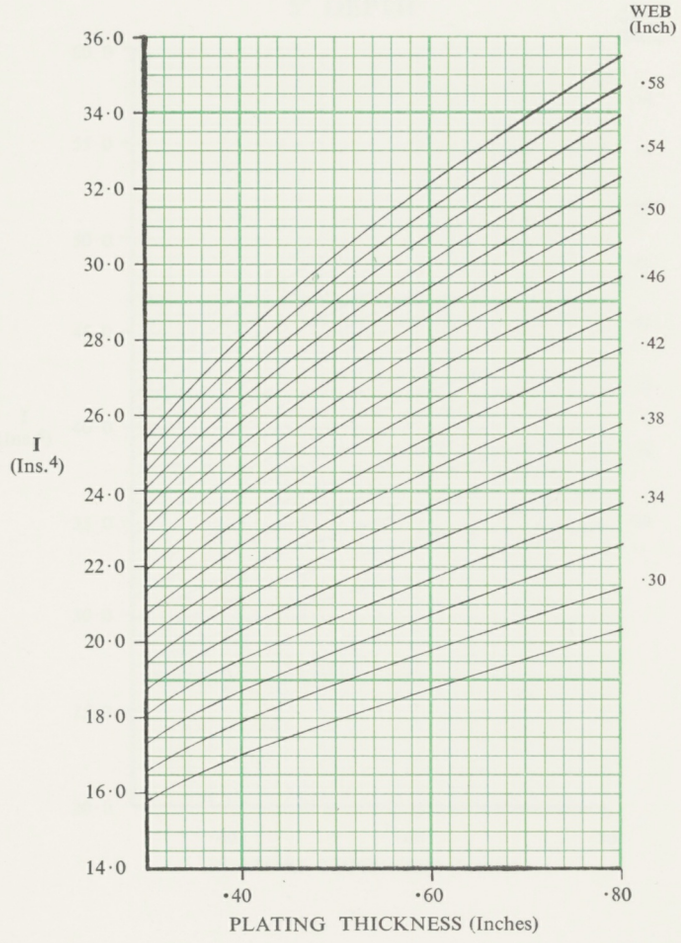
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

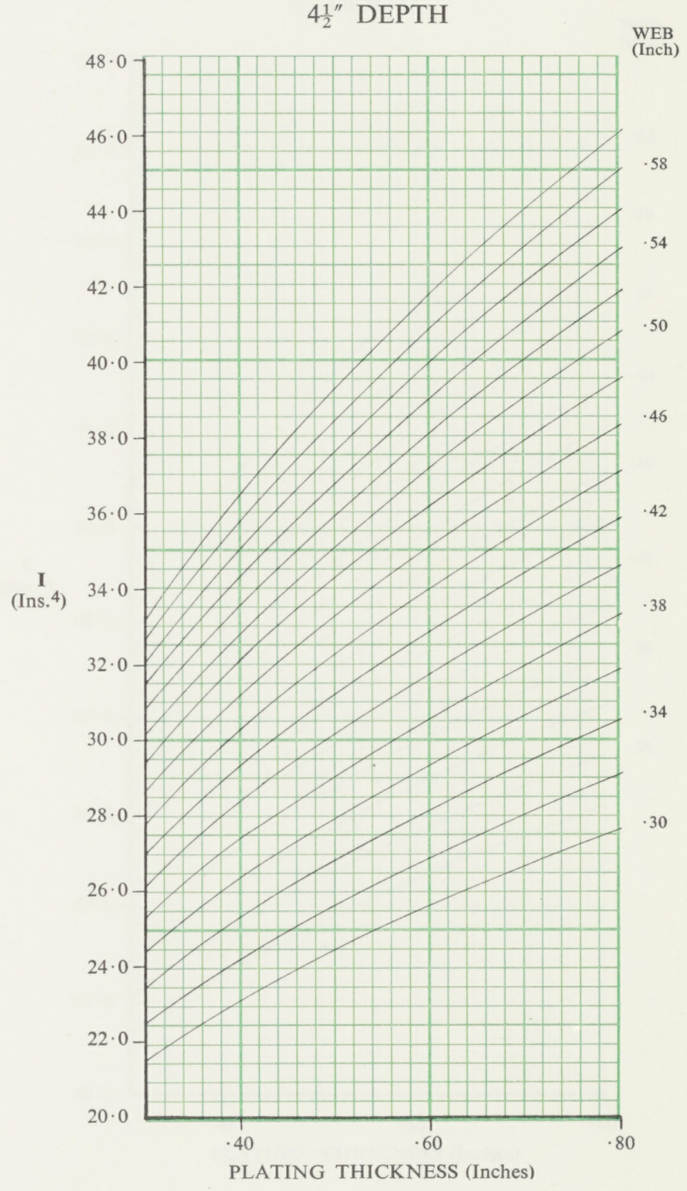


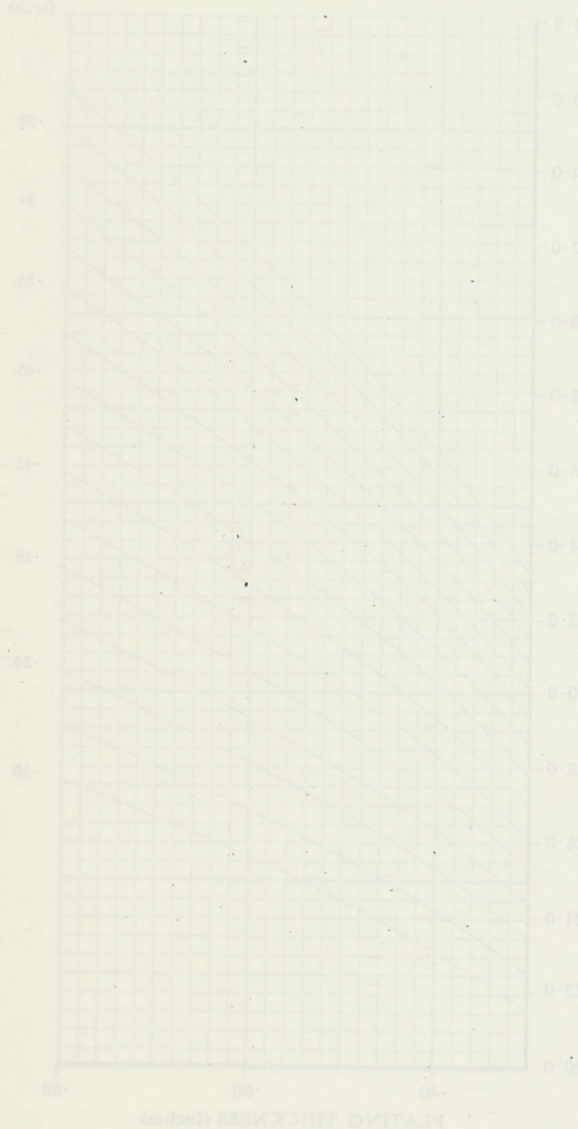
3″ FLANGE

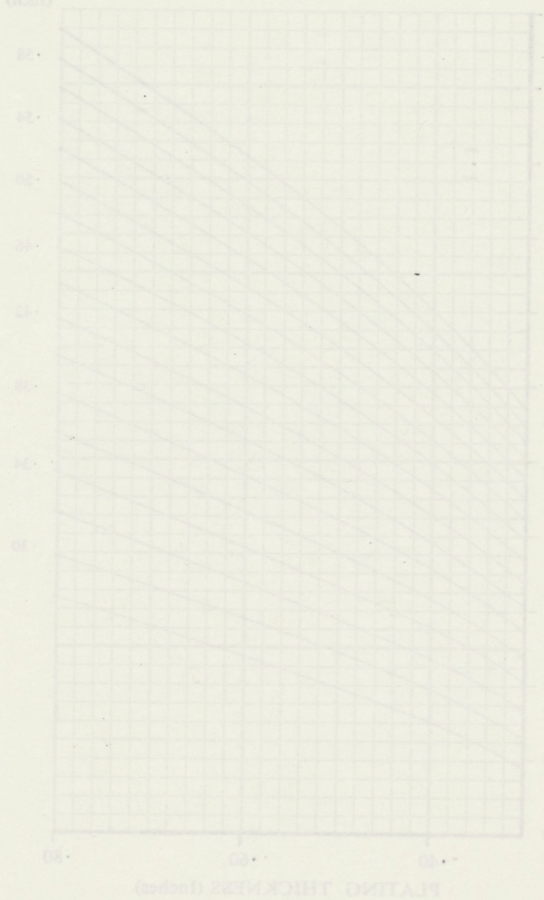
4″ DEPTH



4½″ DEPTH

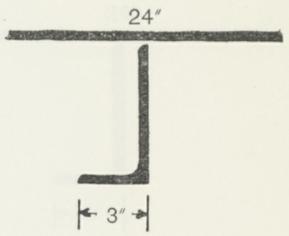






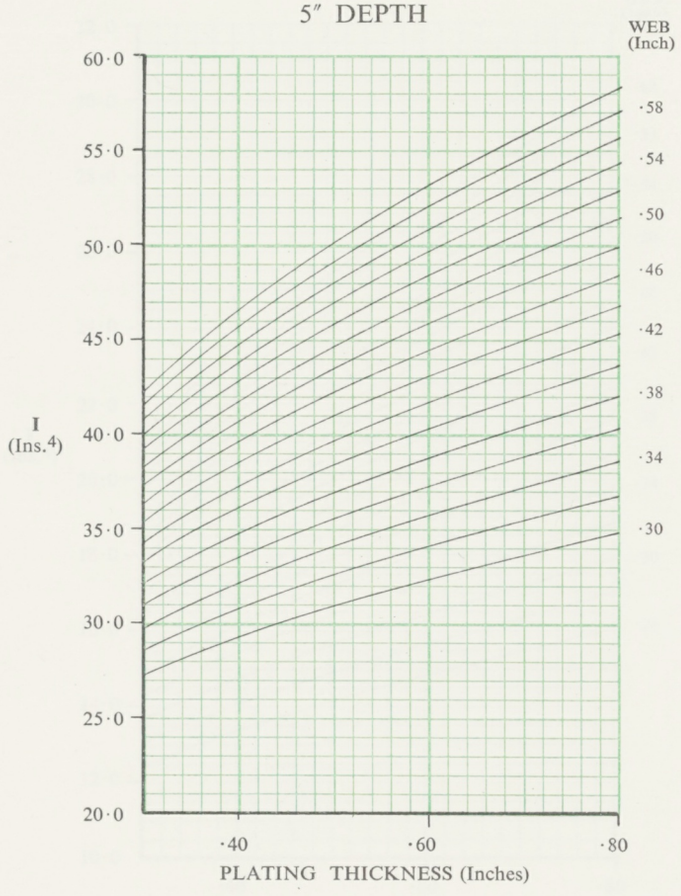
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

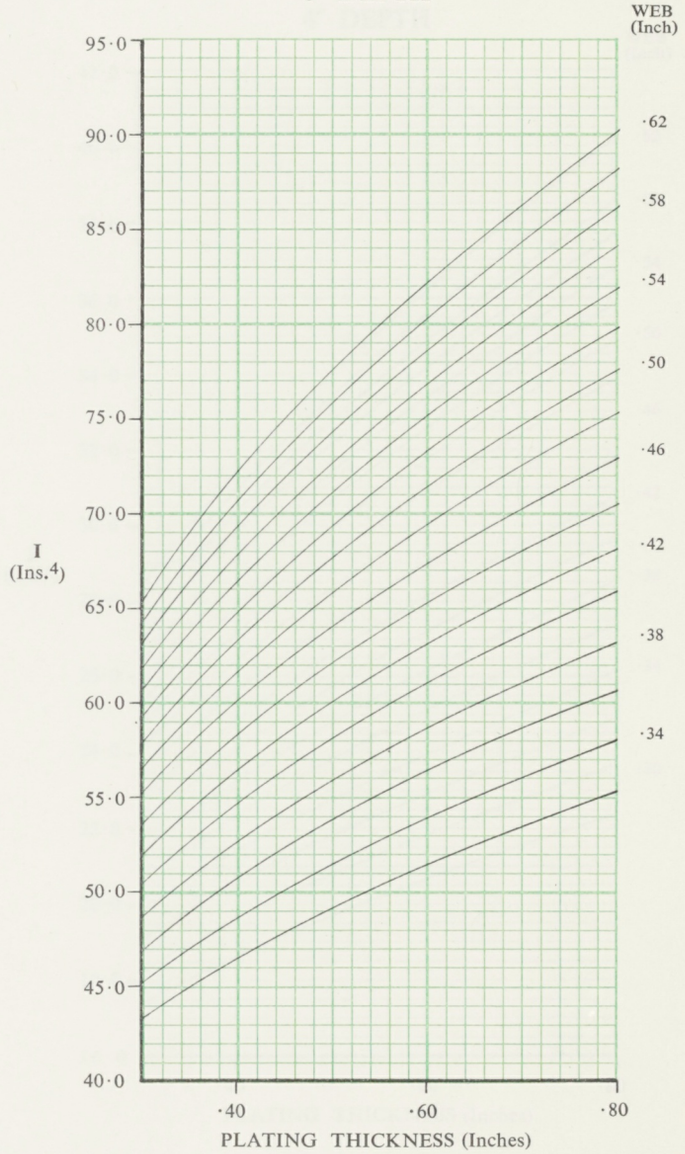


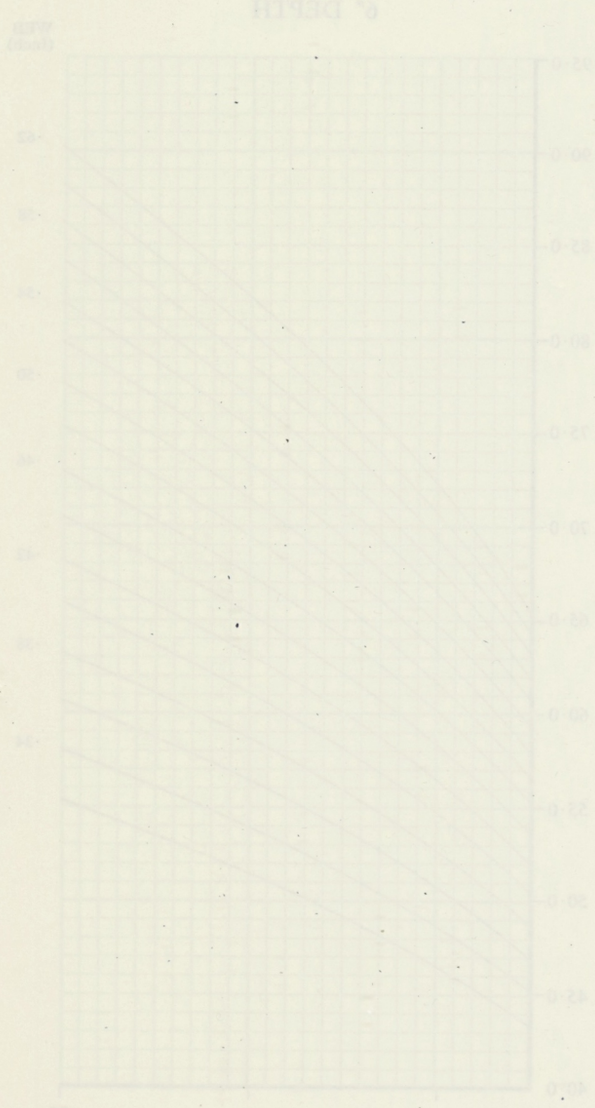
3″ FLANGE

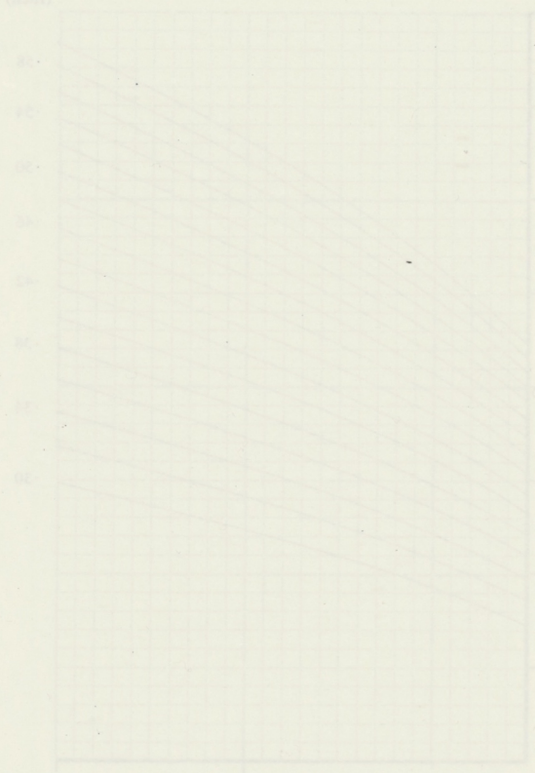
5″ DEPTH



6″ DEPTH

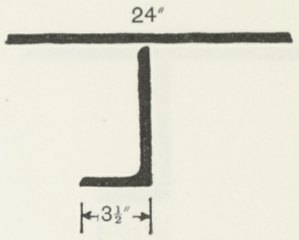






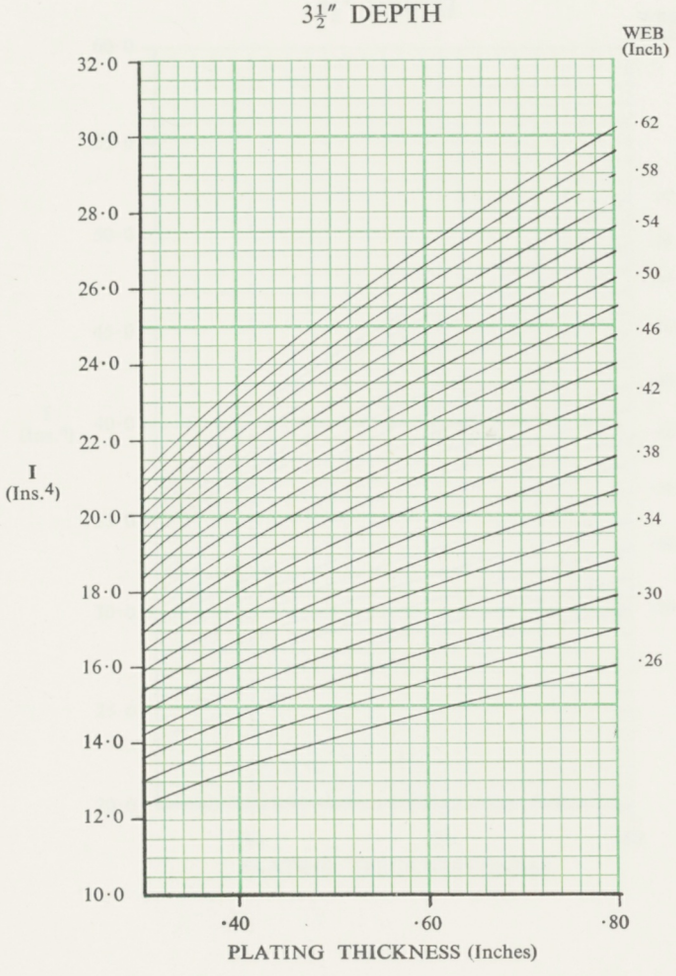
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

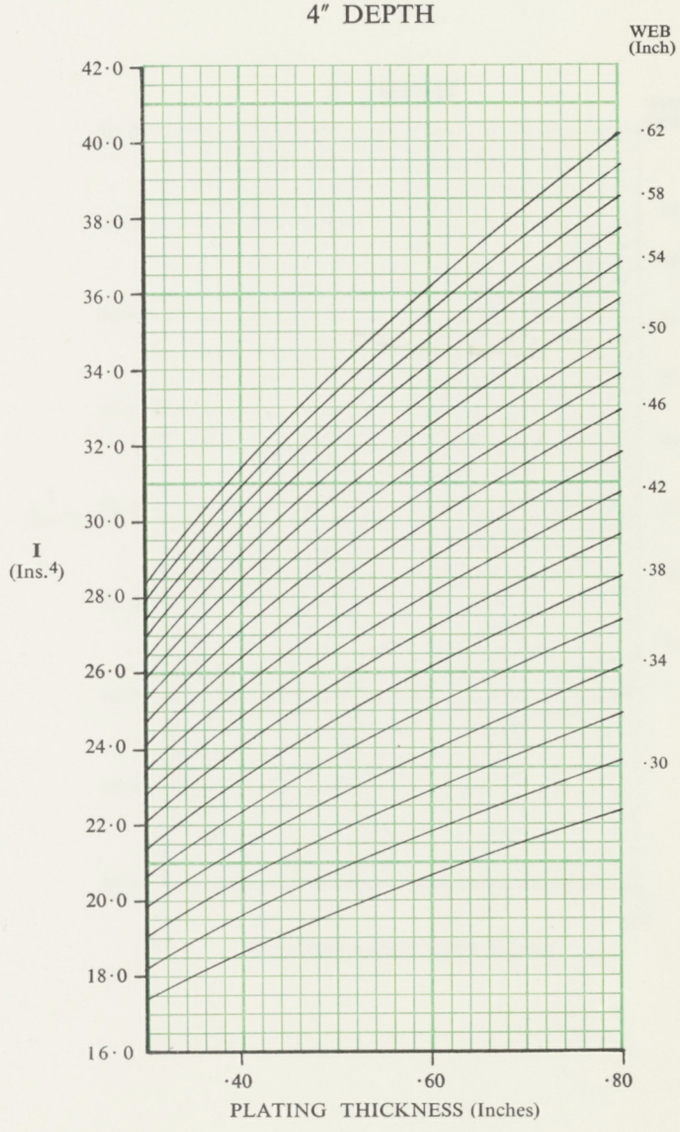


3½″ FLANGE

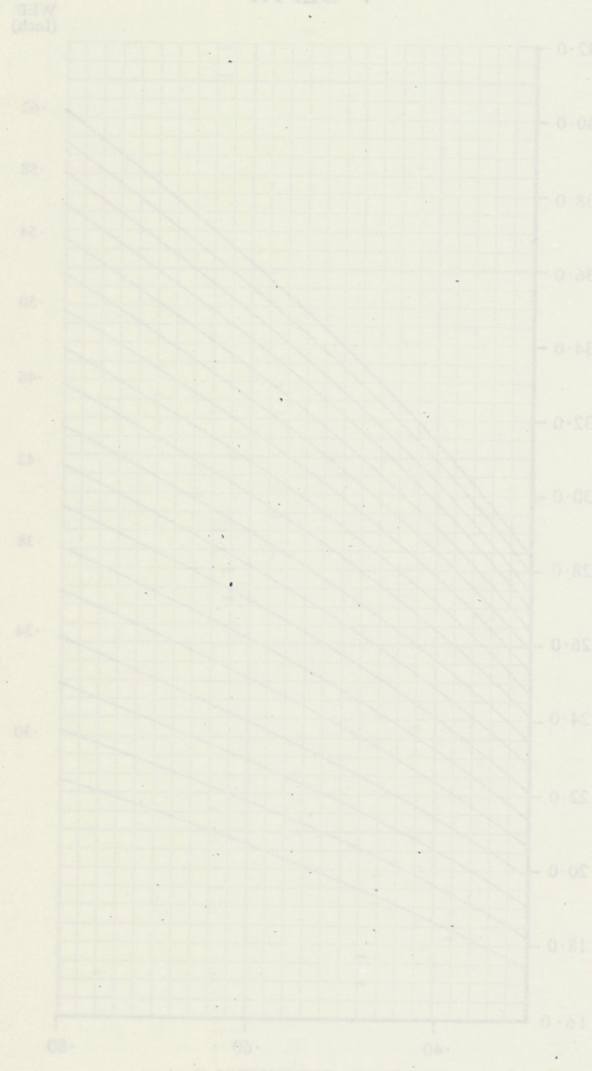
3½″ DEPTH

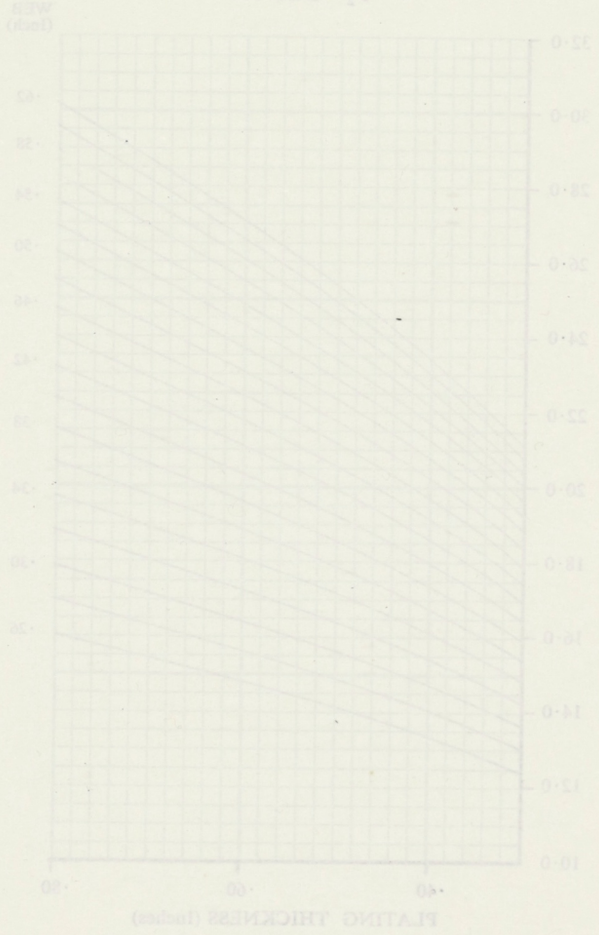


4″ DEPTH



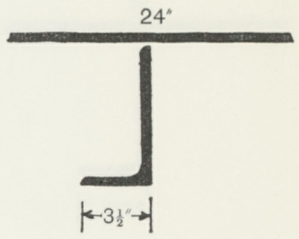
2½"
3½"


4" DEPTH
WEB (Inch)
I (Inch⁴)
PLATING THICKNESS (Inches)

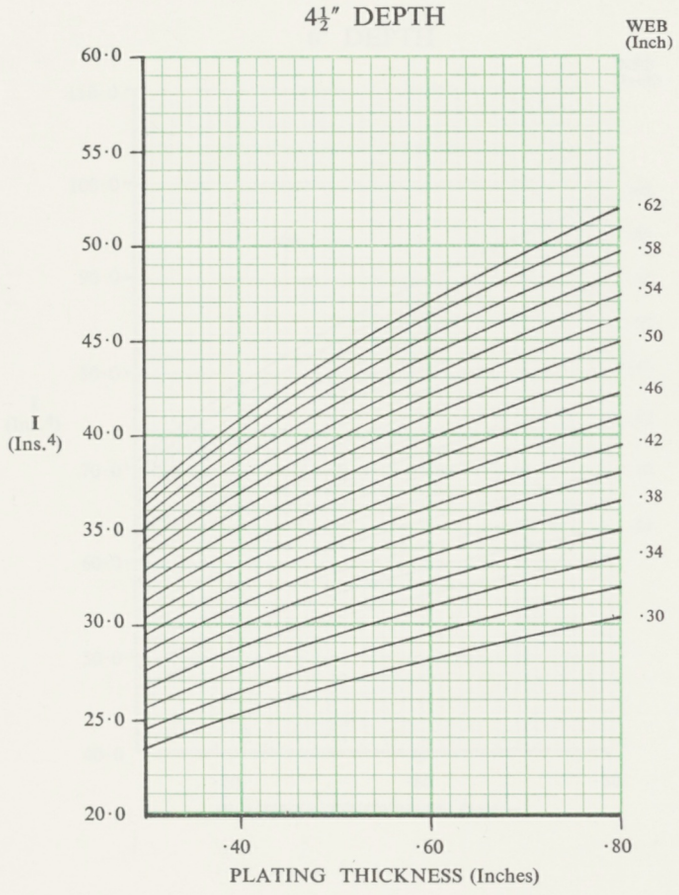

3½" DEPTH
WEB (Inch)
I (Inch⁴)
PLATING THICKNESS (Inches)

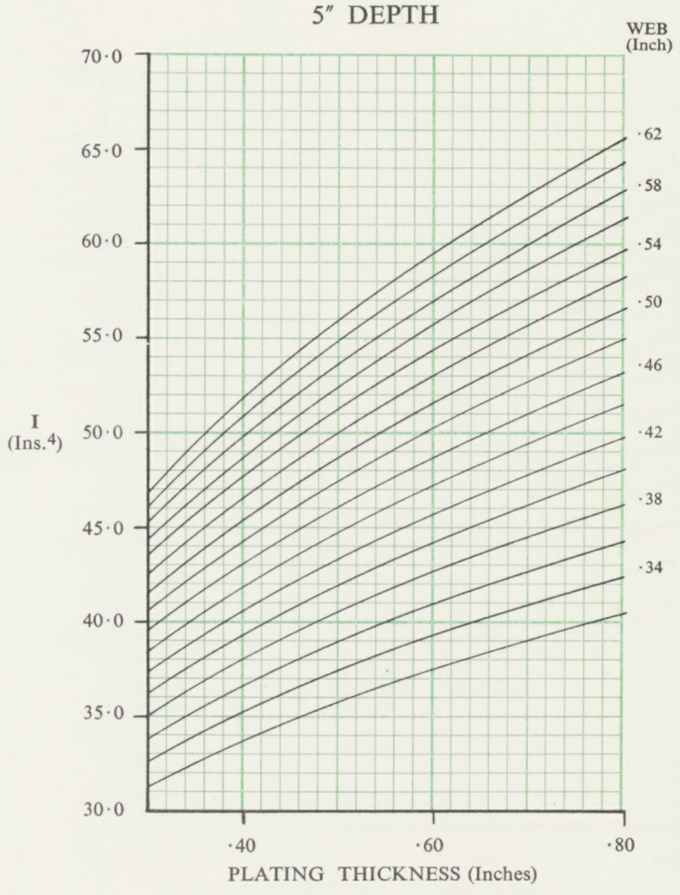
MOMENT OF INERTIA OF INVERTED ANGLES

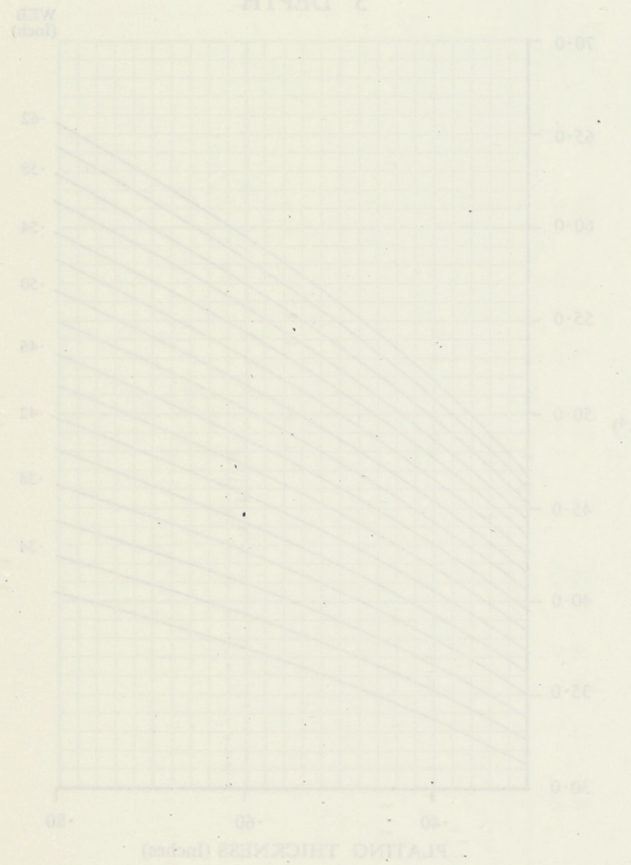
(WITH PLATING)

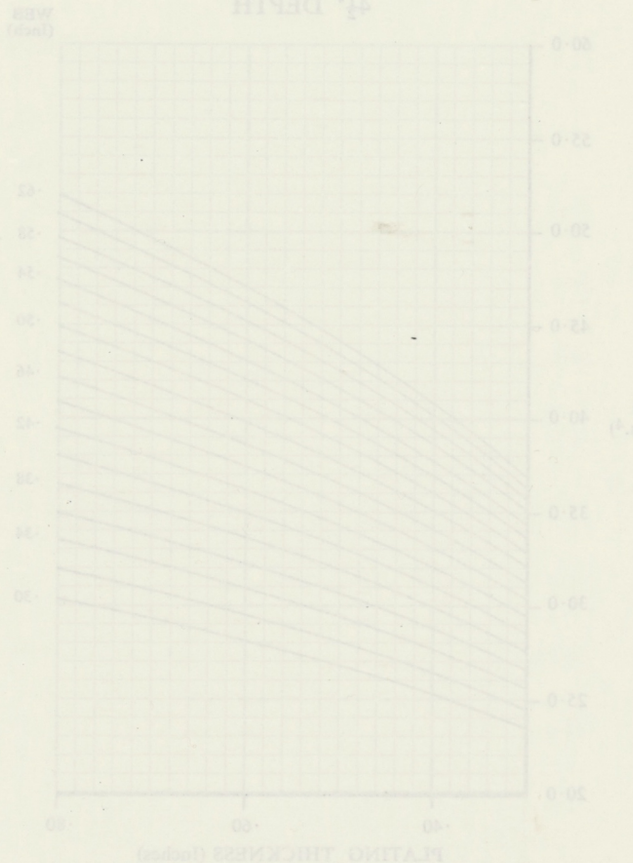


3½″ FLANGE



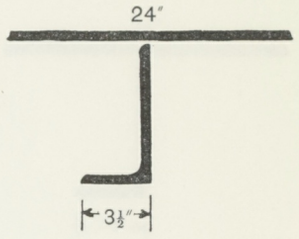






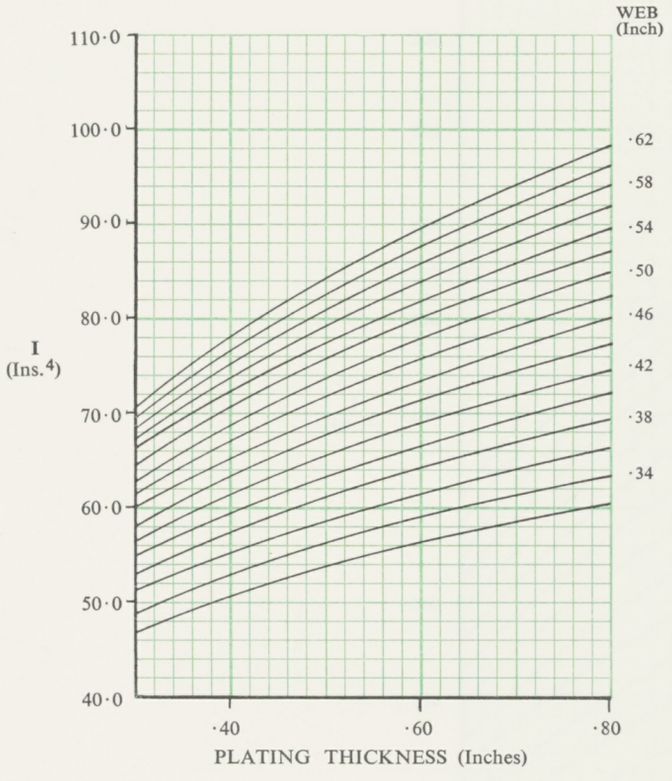
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

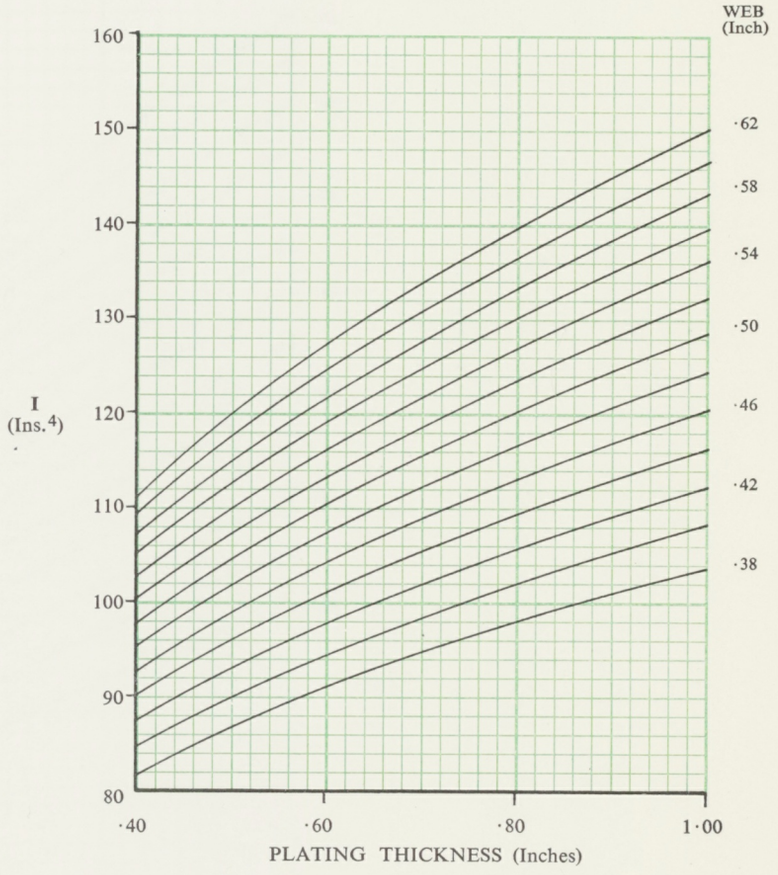


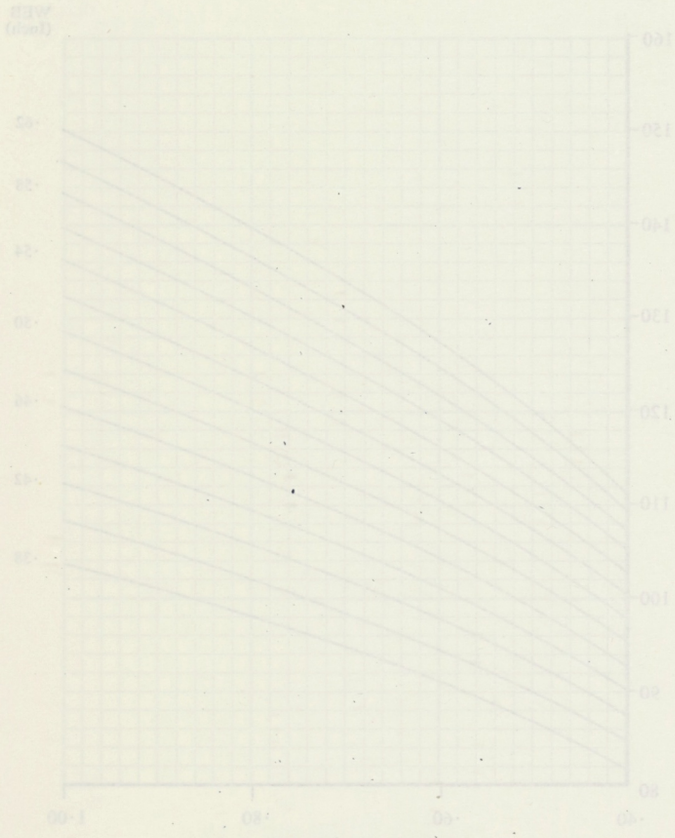
3½″ FLANGE

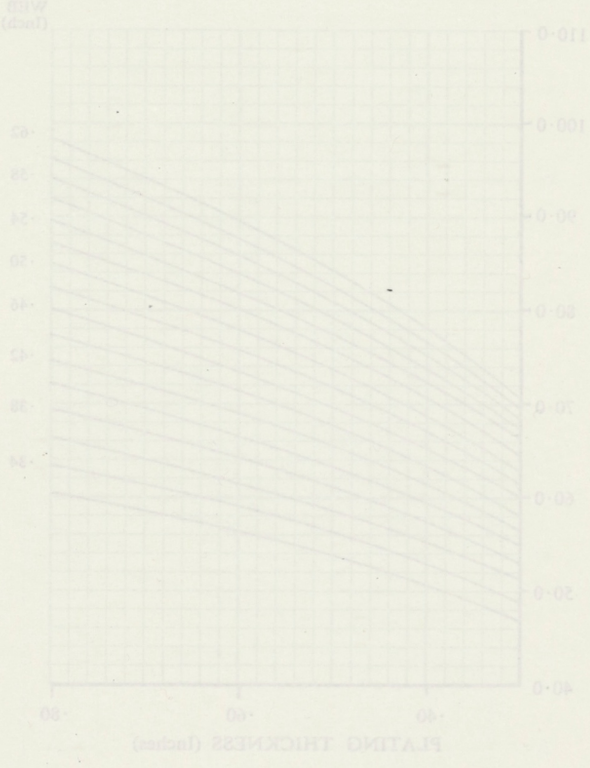
6″ DEPTH



7″ DEPTH

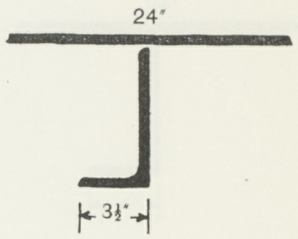






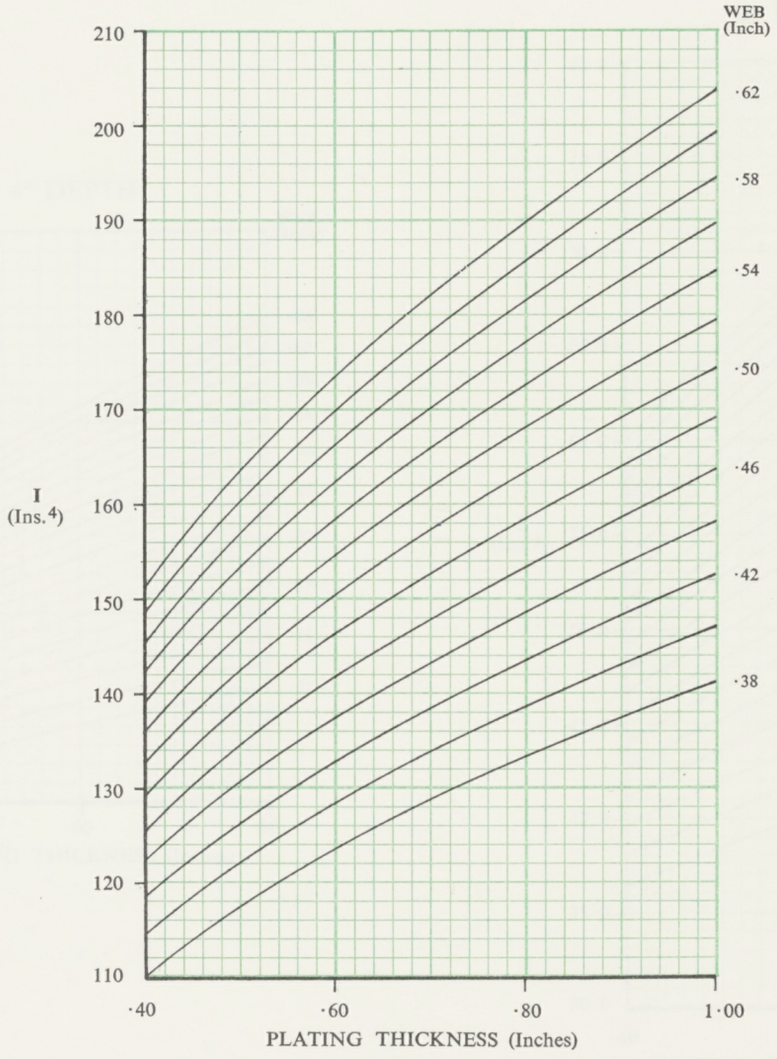
MOMENT OF INERTIA OF INVERTED ANGLES

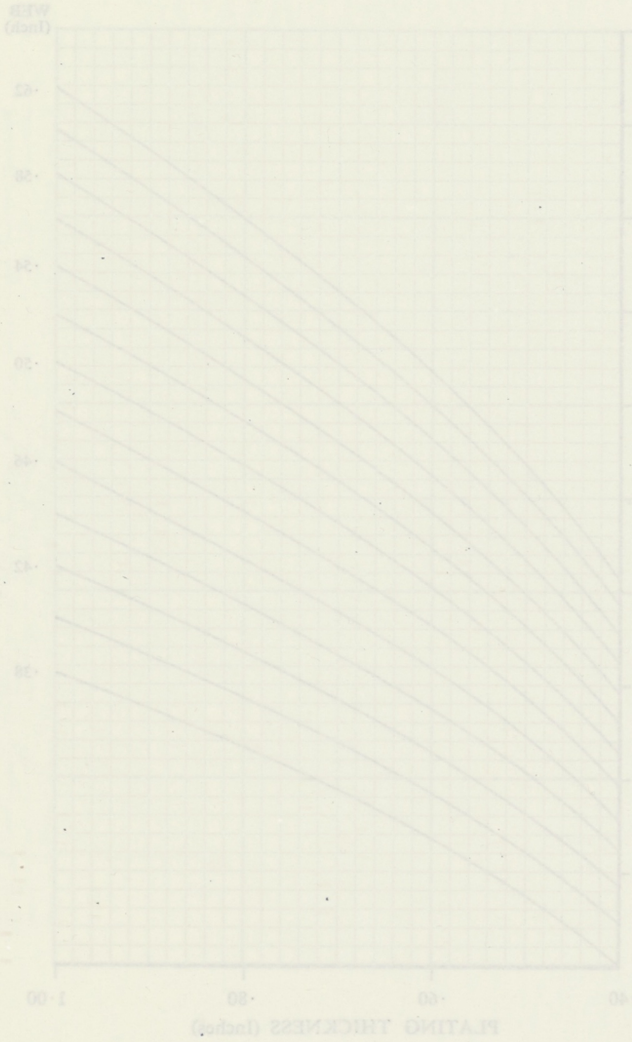
(WITH PLATING)



3½″ FLANGE

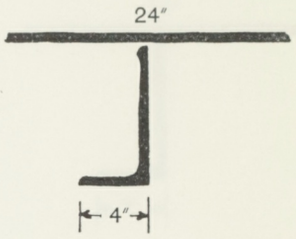
8″ DEPTH





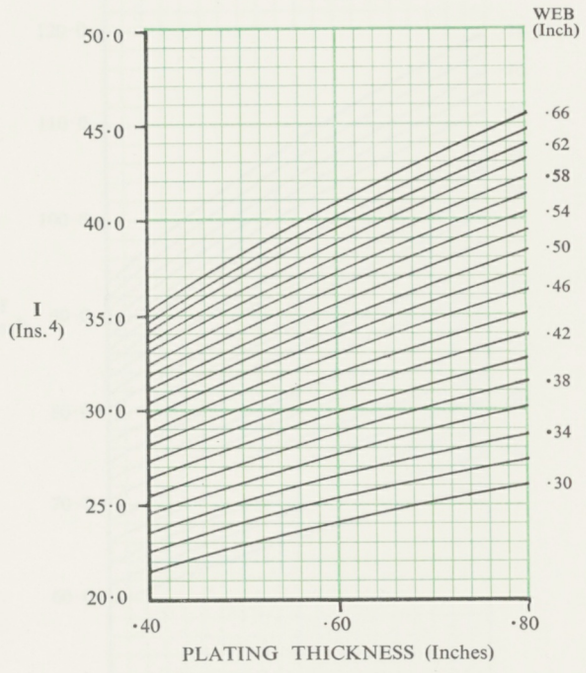
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

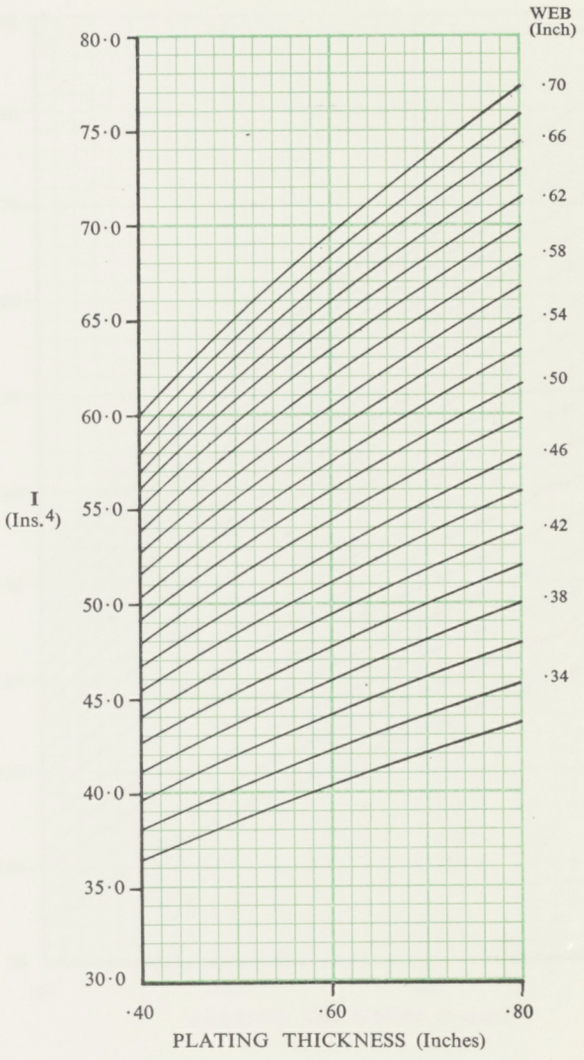


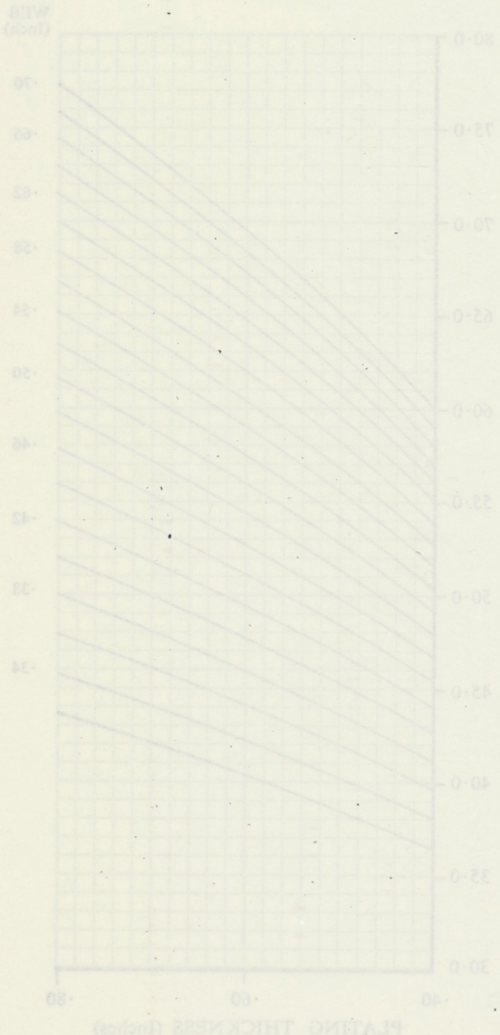
4″ FLANGE

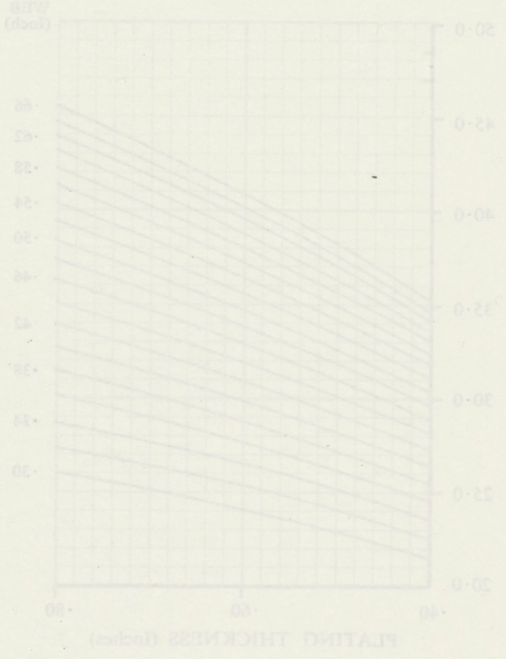
4″ DEPTH



5″ DEPTH

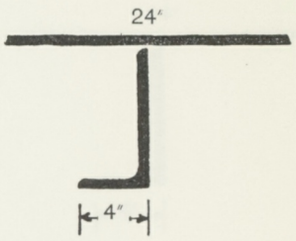






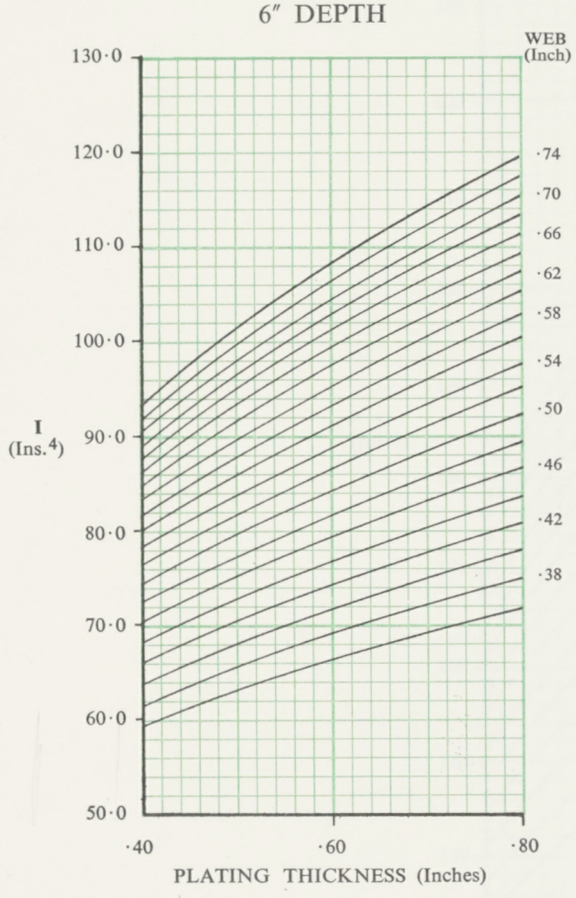
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)

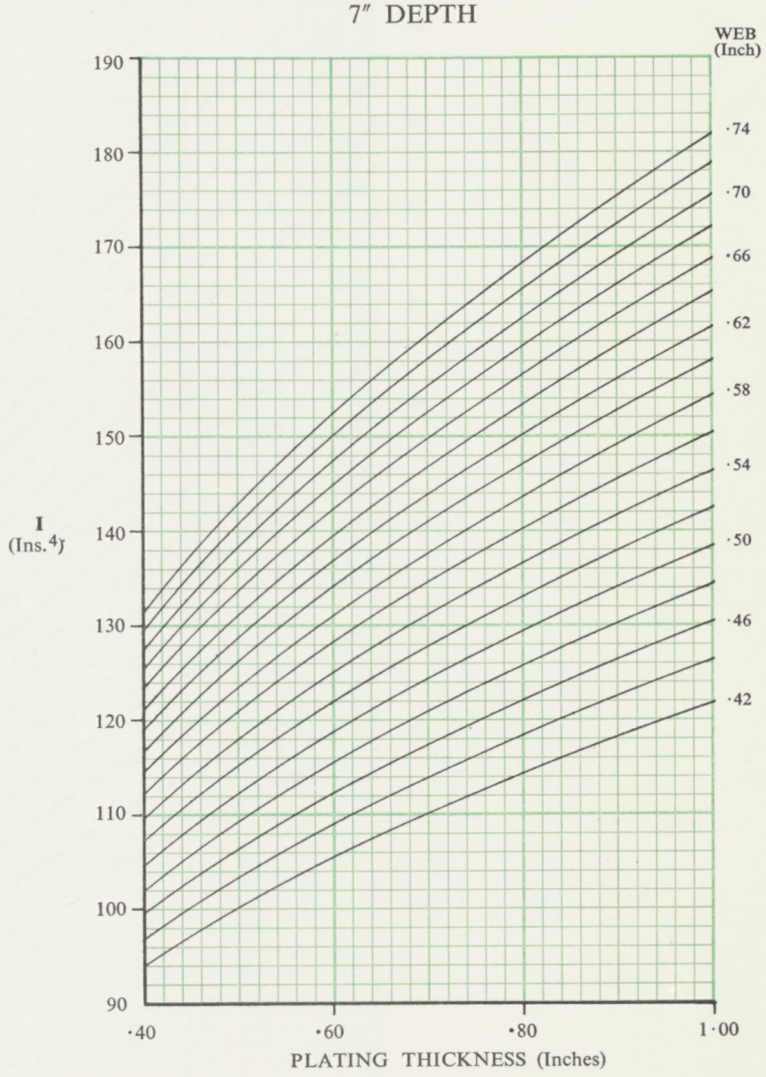


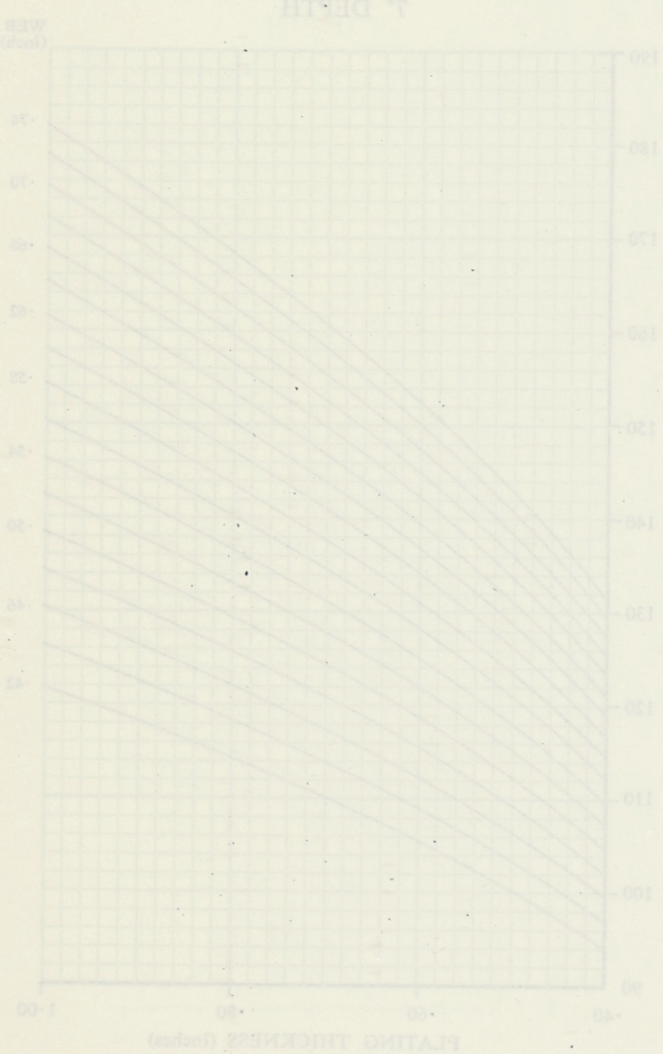
4″ FLANGE

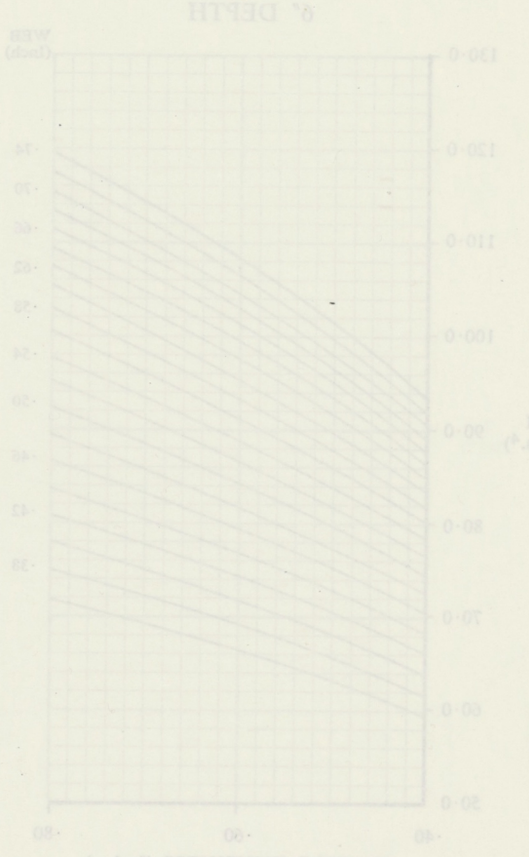
6″ DEPTH



7″ DEPTH

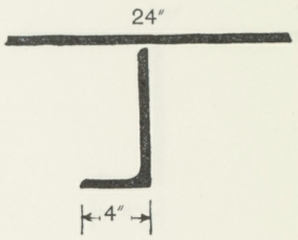






MOMENT OF INERTIA OF INVERTED ANGLES

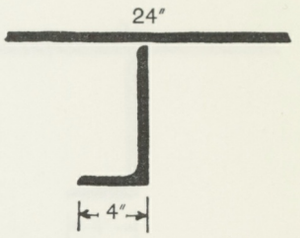
(WITH PLATING)



4″ FLANGE

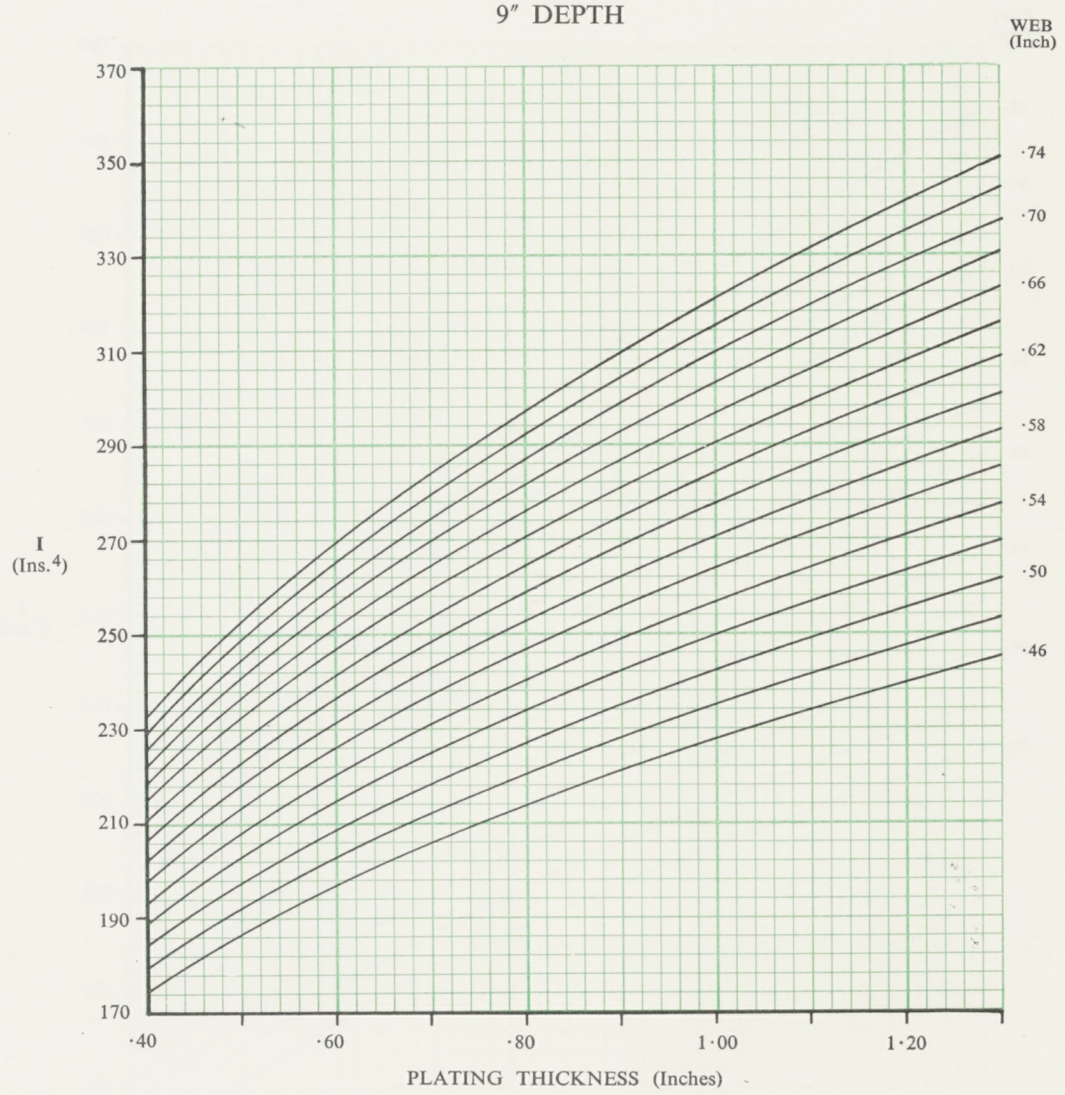
MOMENT OF INERTIA OF INVERTED ANGLES

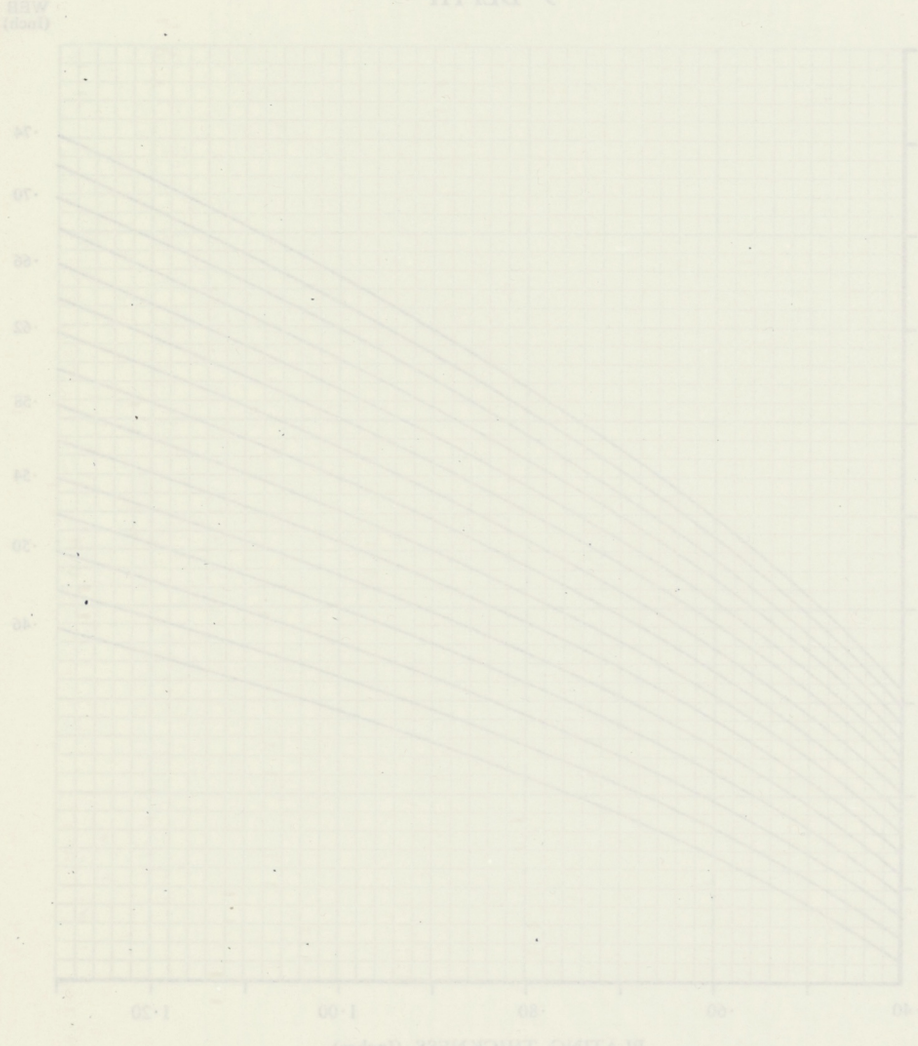
(WITH PLATING)



4″ FLANGE

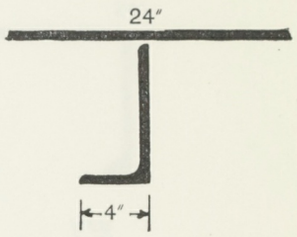
9″ DEPTH





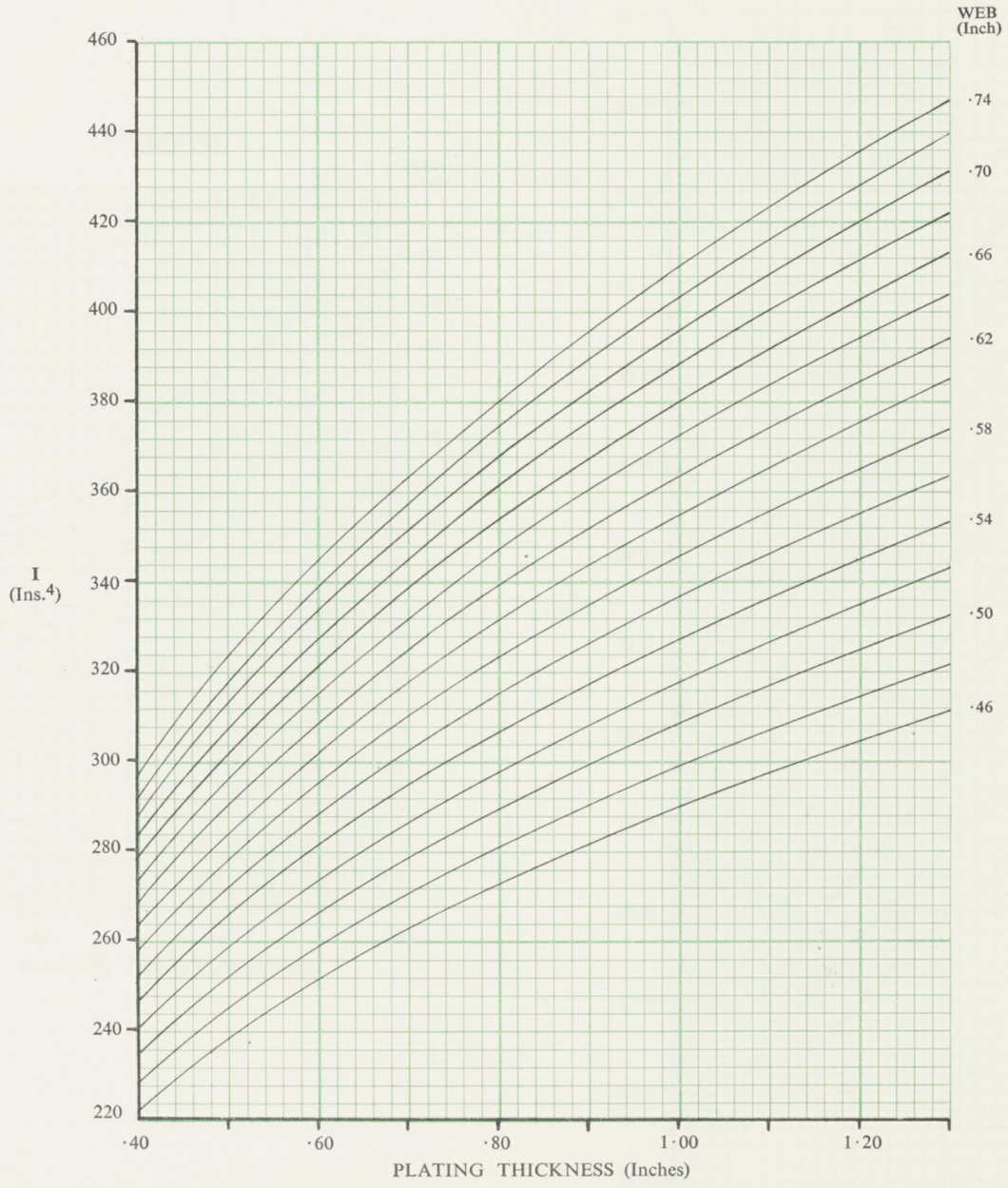
MOMENT OF INERTIA OF INVERTED ANGLES

(WITH PLATING)



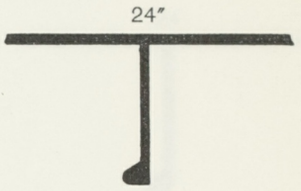
4″ FLANGE

10″ DEPTH

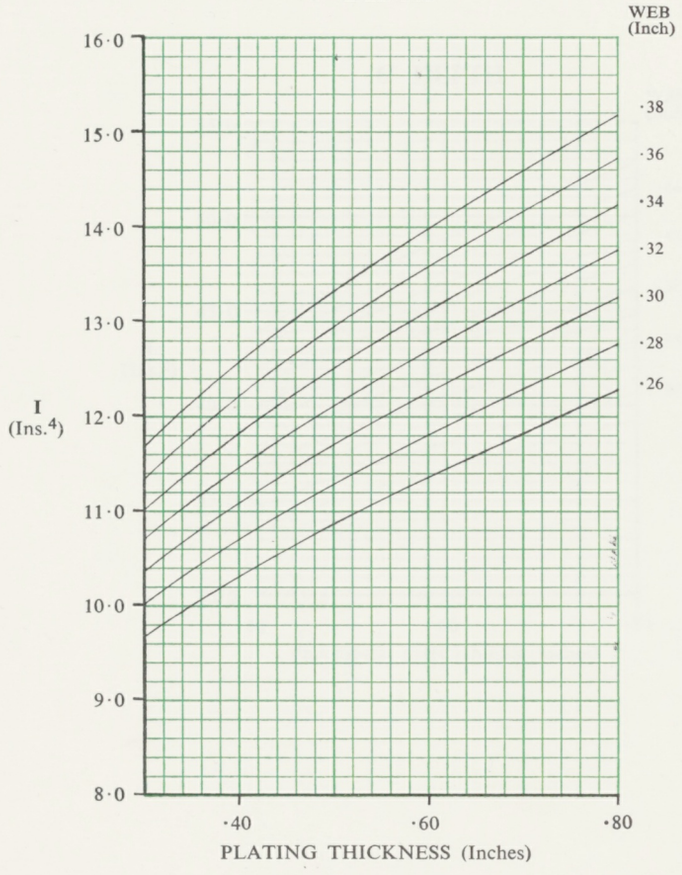


MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

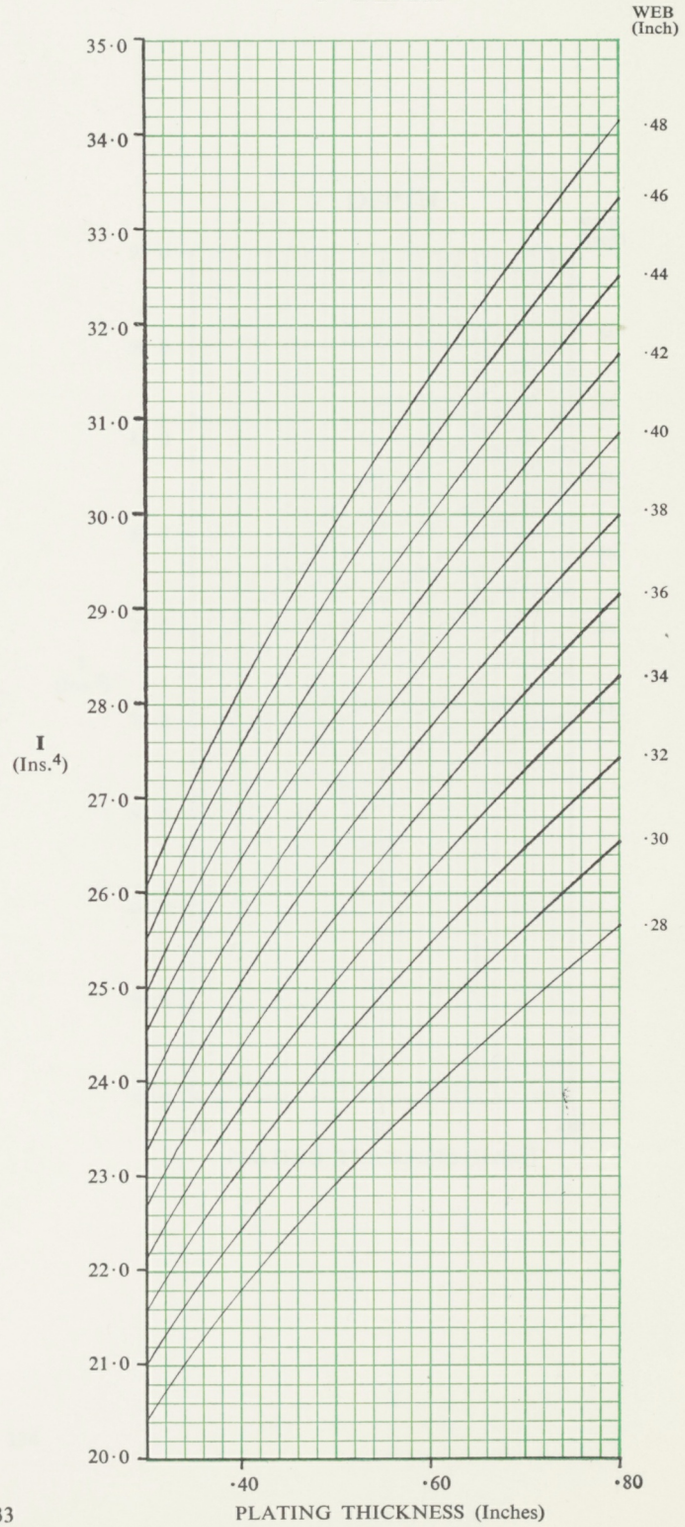
(WITH PLATING)

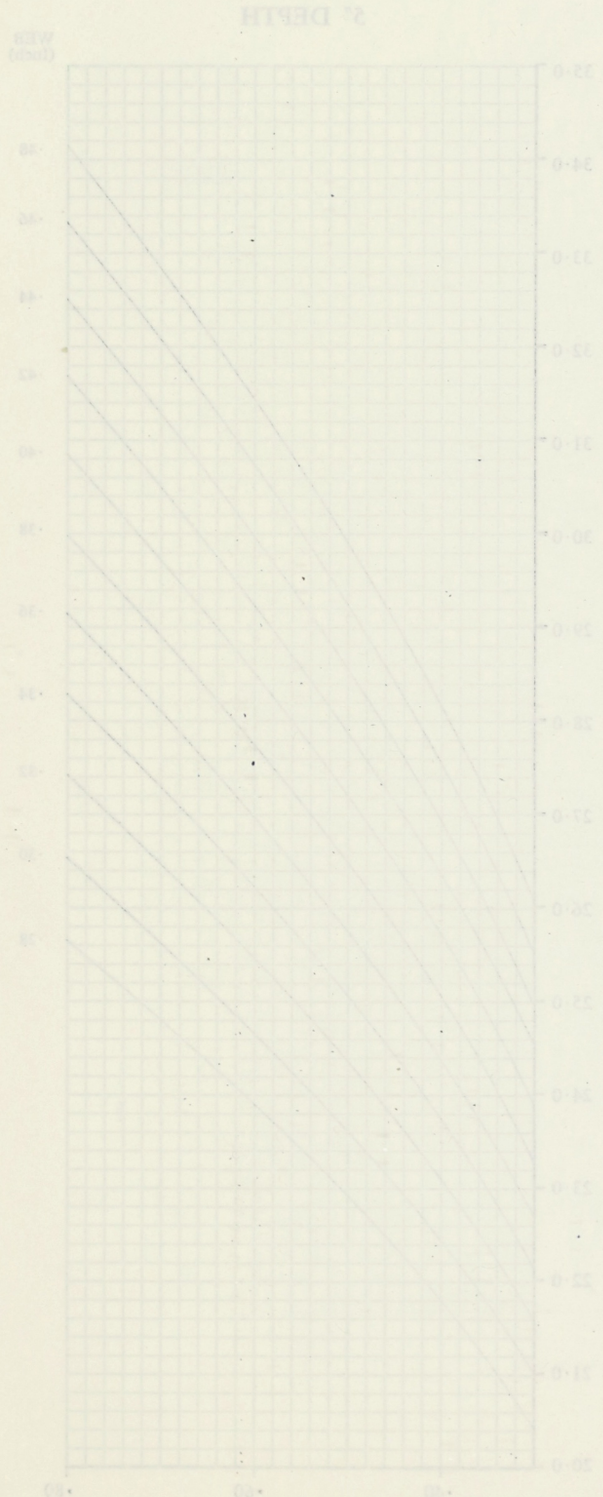


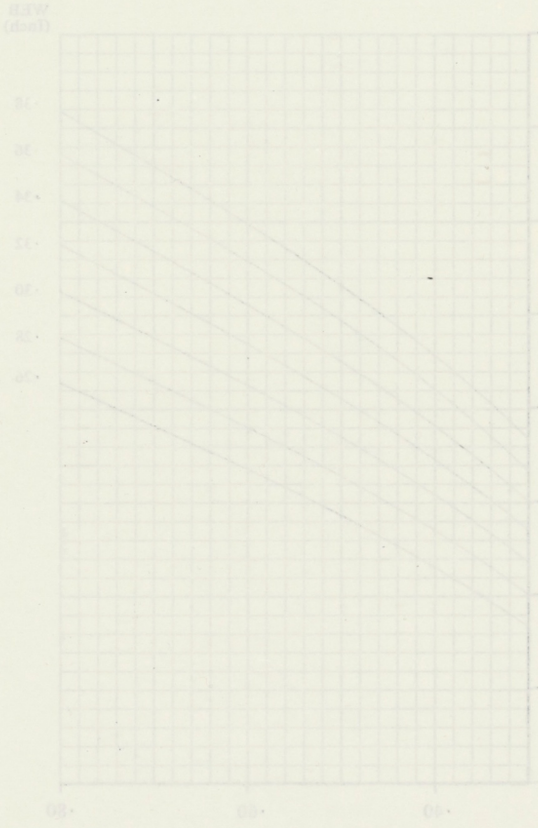
4″ DEPTH



5″ DEPTH

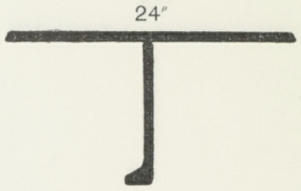


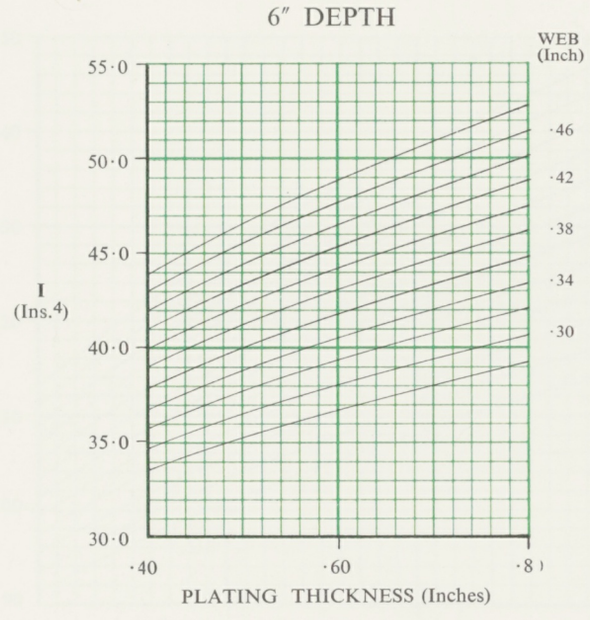


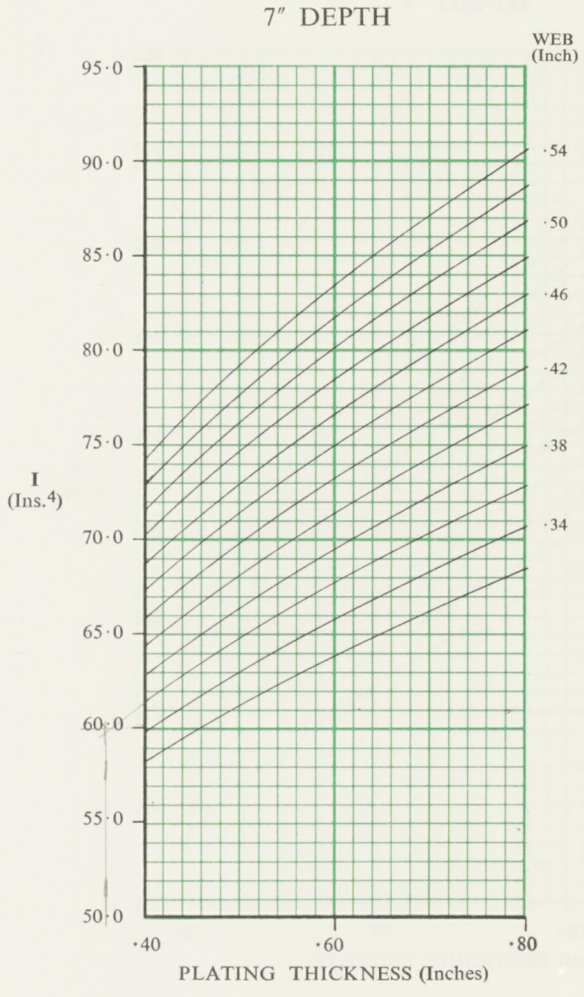


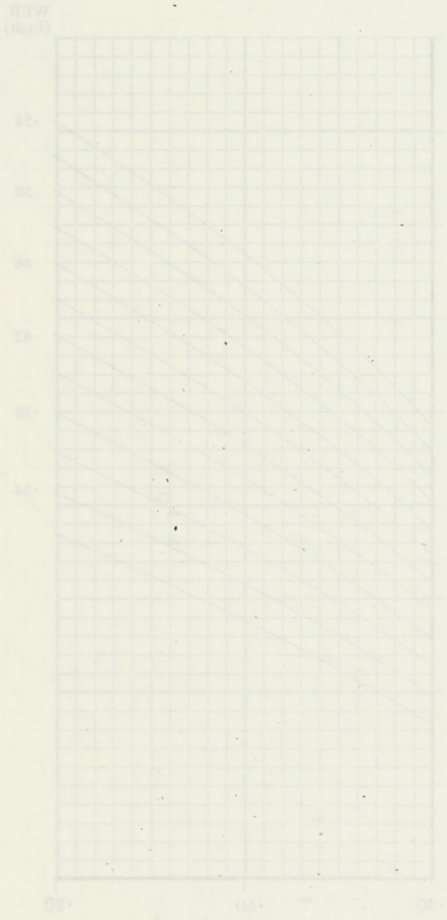
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

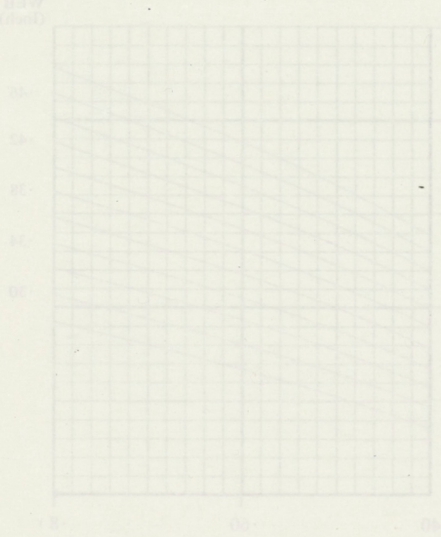
(WITH PLATING)





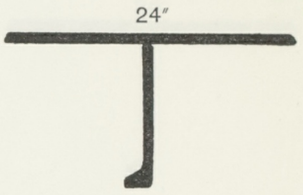




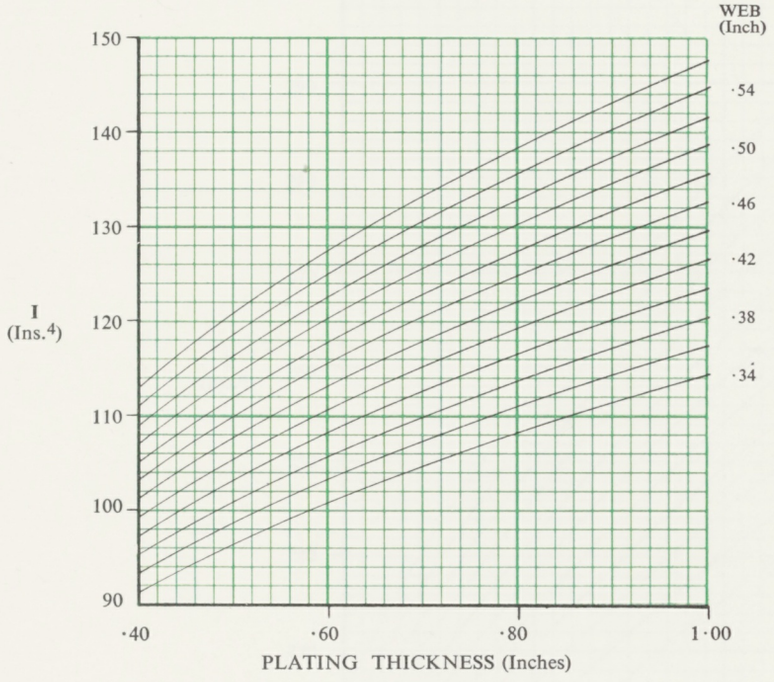


MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

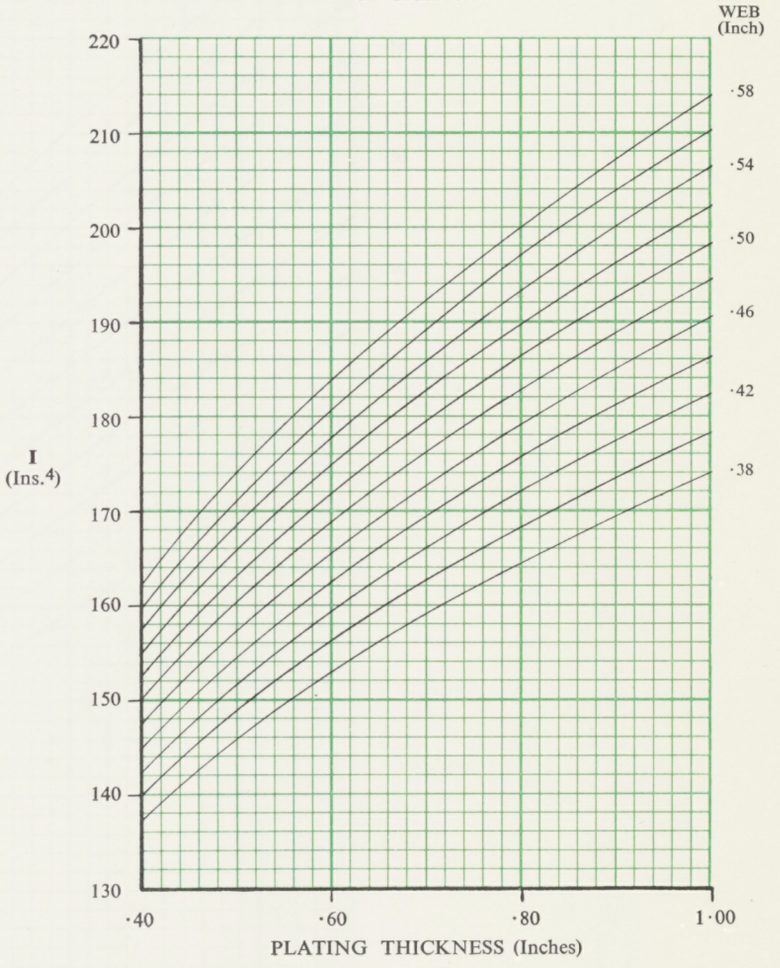
(WITH PLATING)

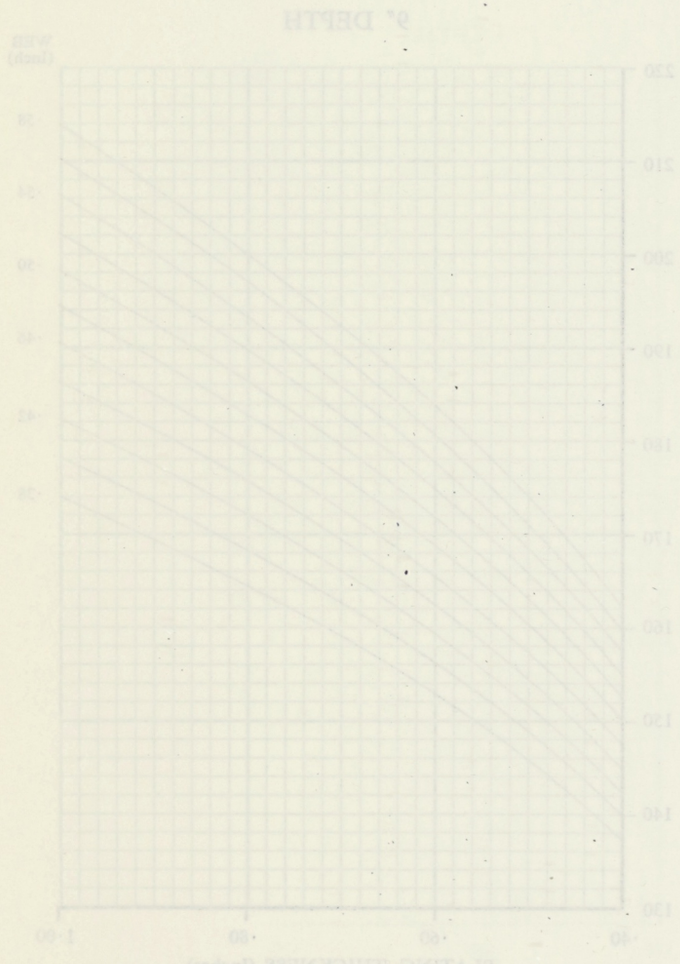


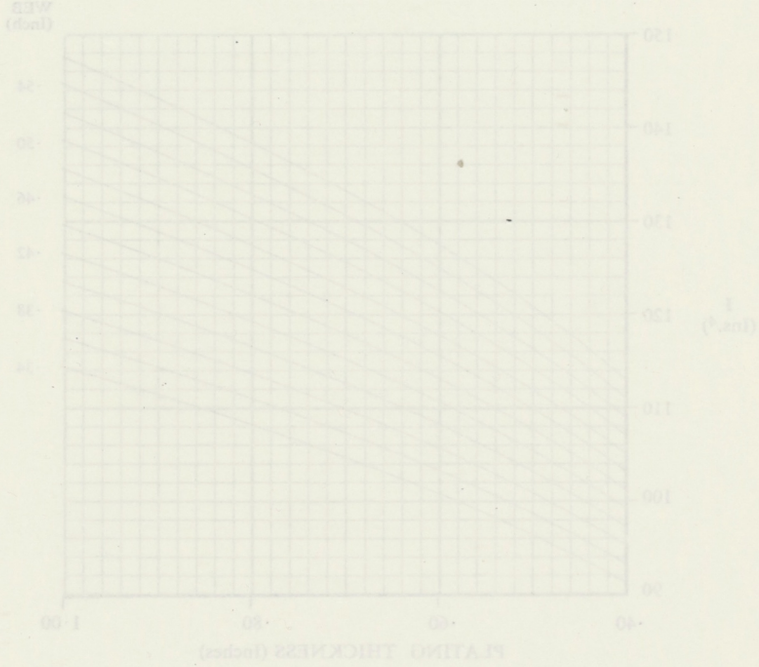
8″ DEPTH



9″ DEPTH

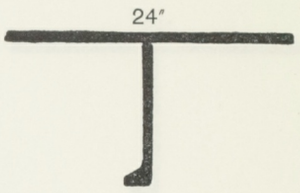



9" DEPTH
WEB (inch)
I (ins⁴)
PLATING THICKNESS (inches)

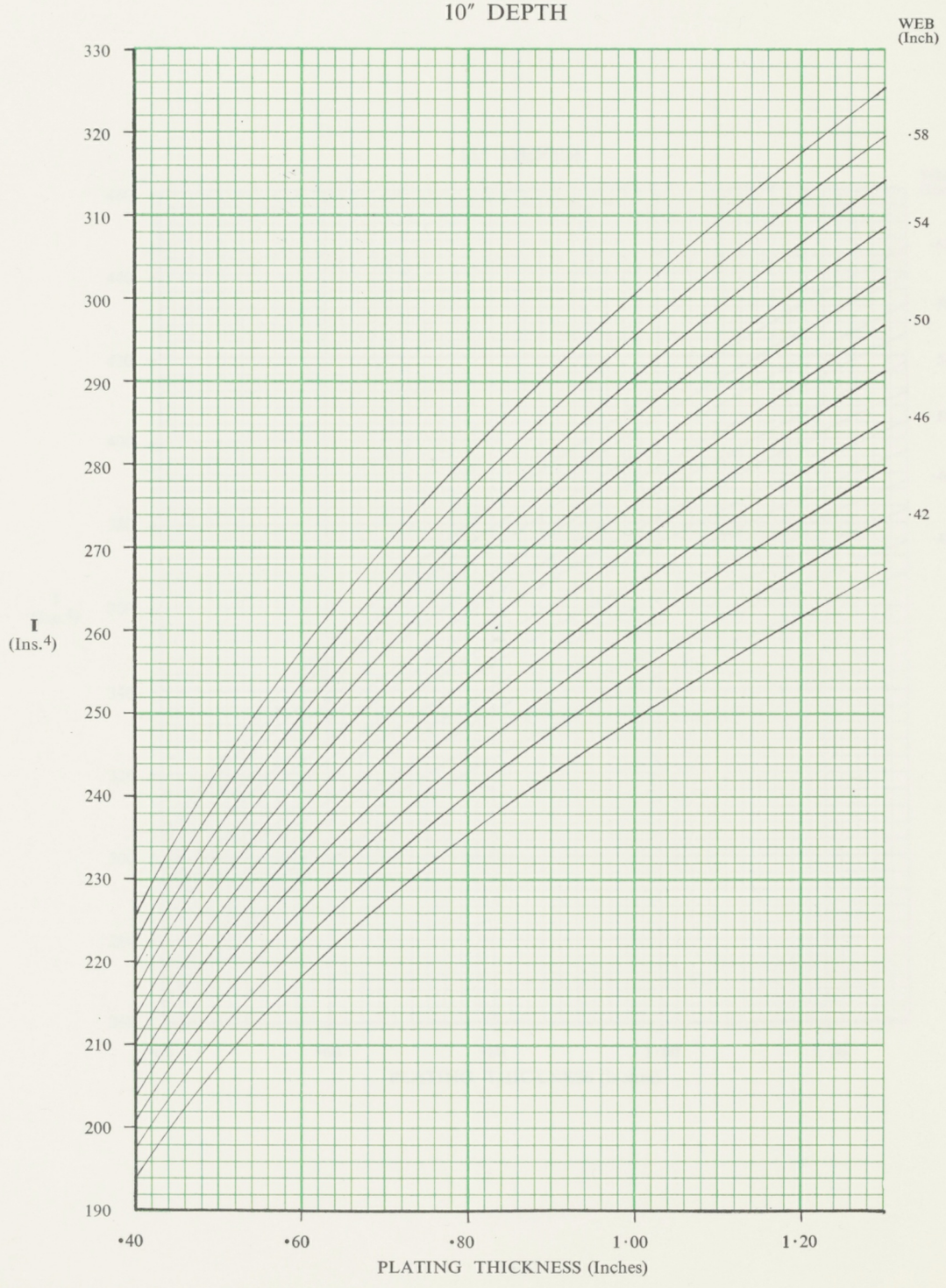

8" DEPTH
WEB (inch)
I (ins⁴)
PLATING THICKNESS (inches)

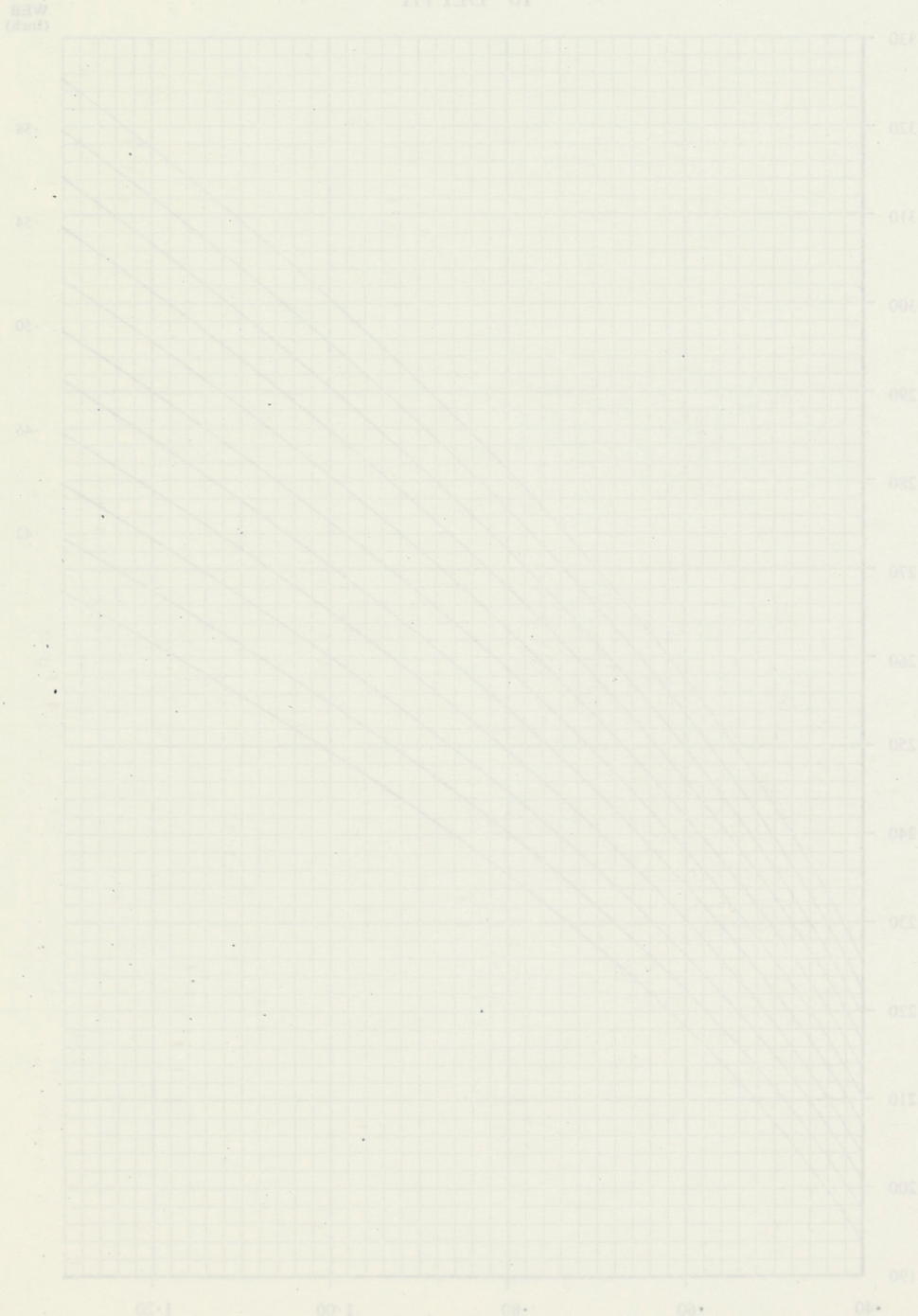
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



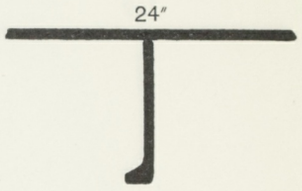
10″ DEPTH



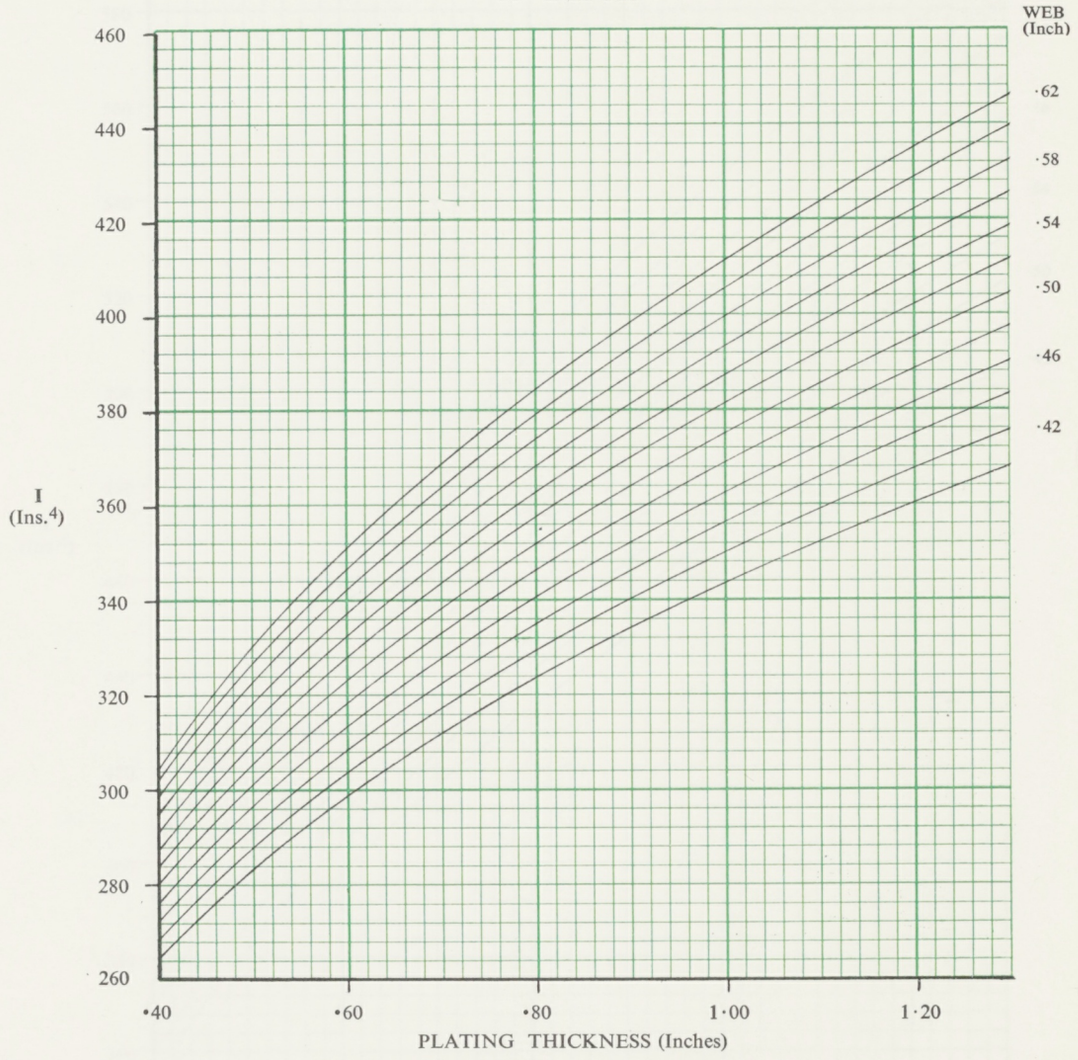


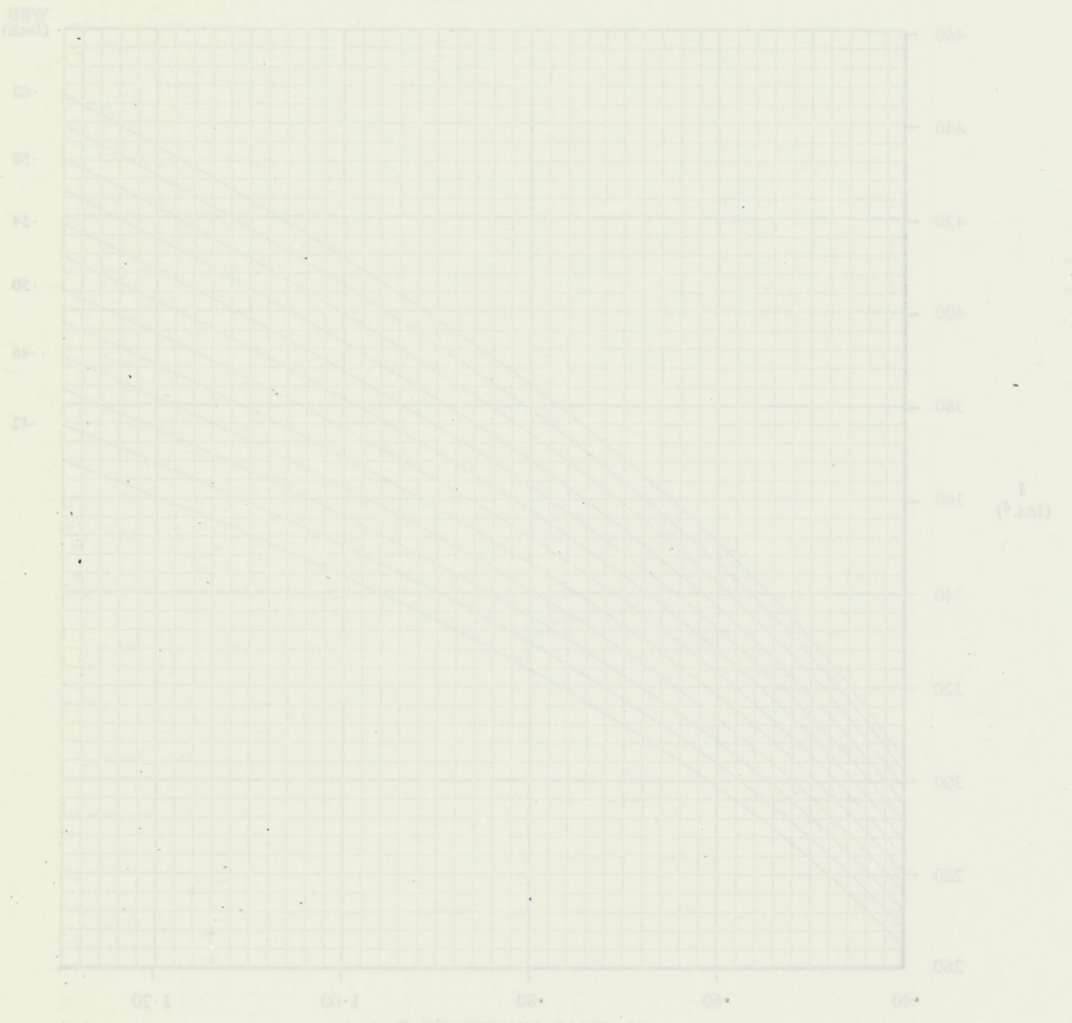
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



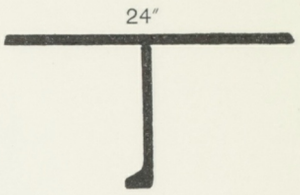
11″ DEPTH

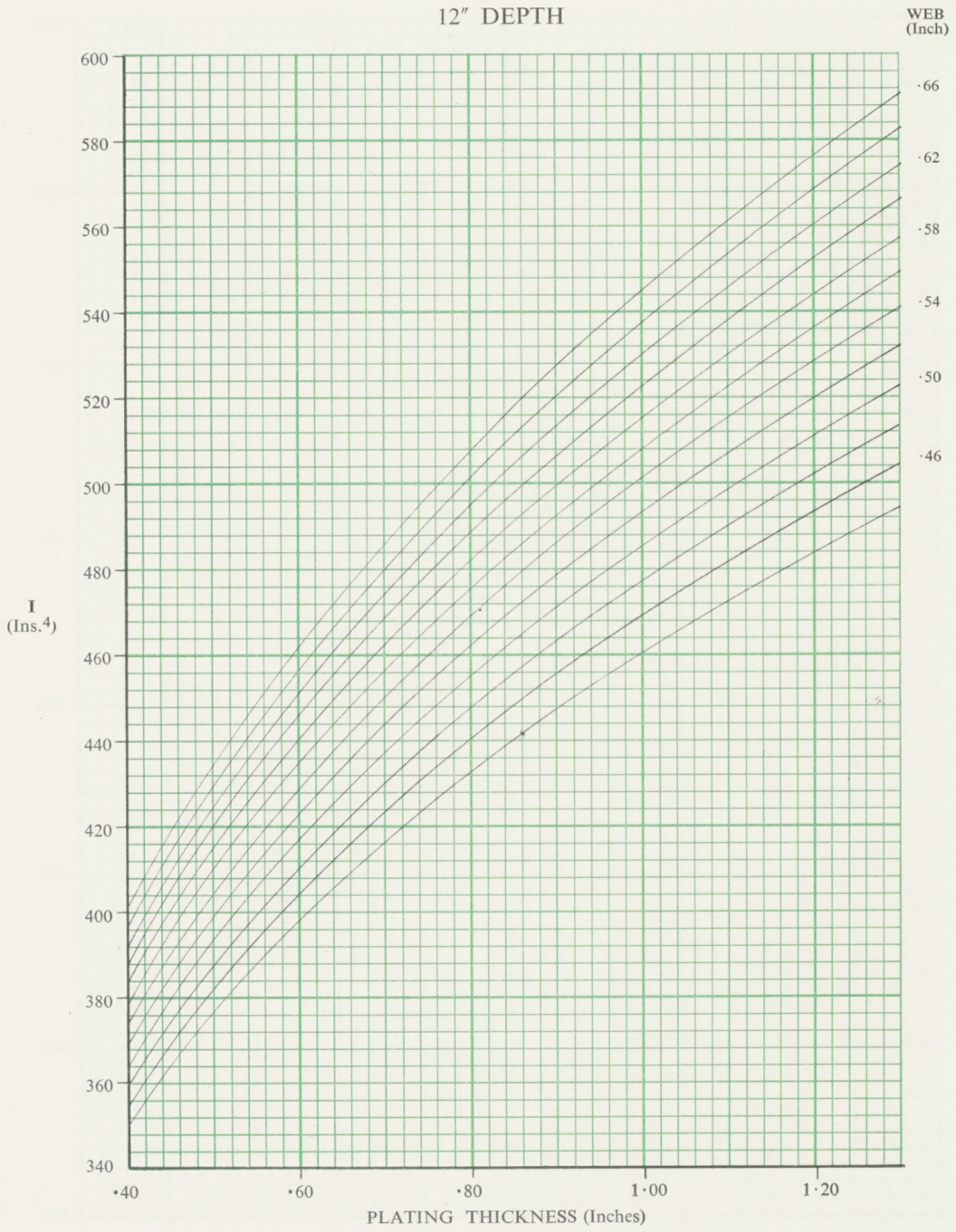




MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

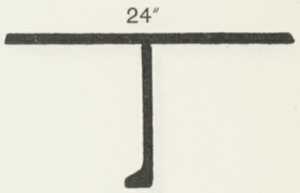
(WITH PLATING)



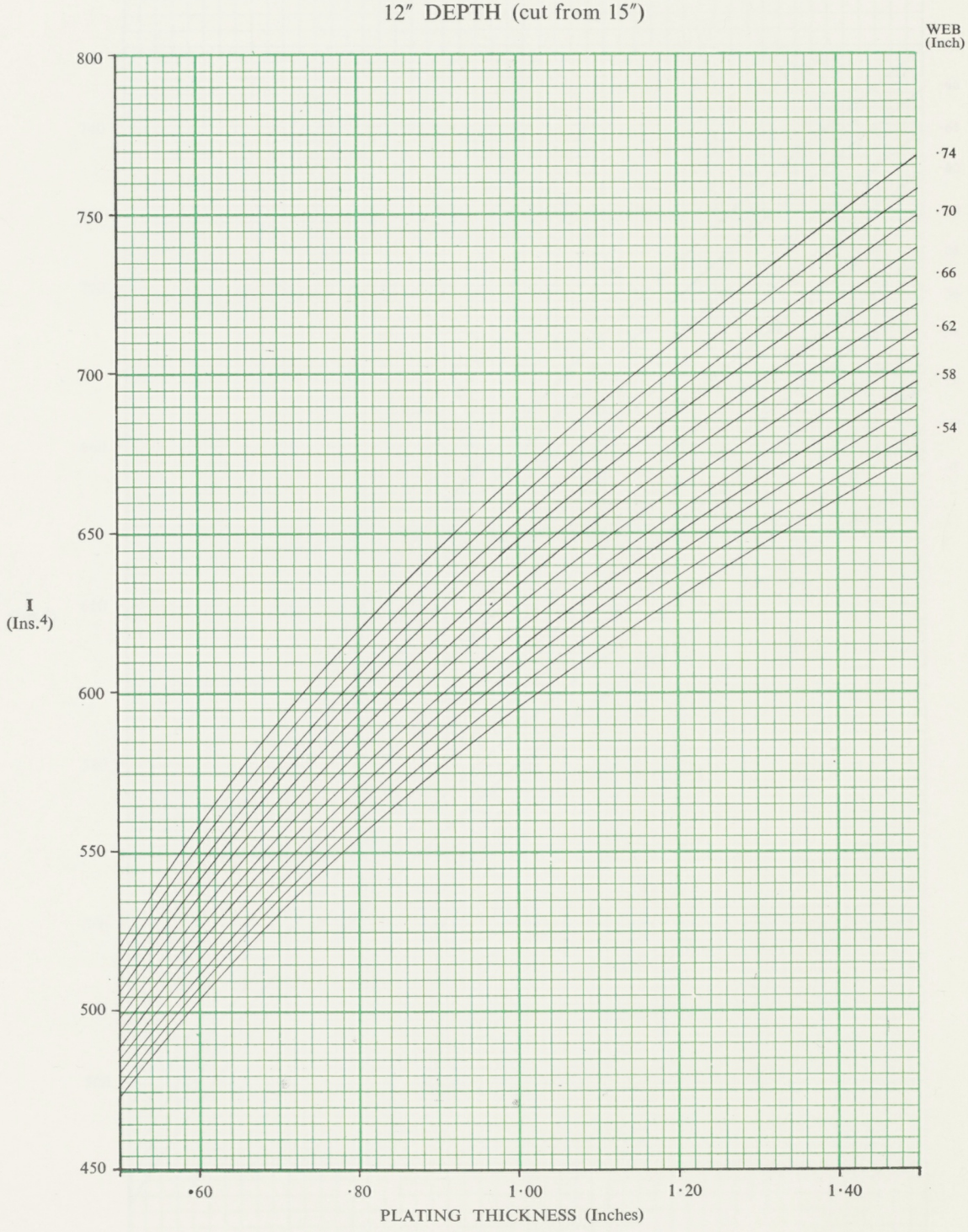


MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)

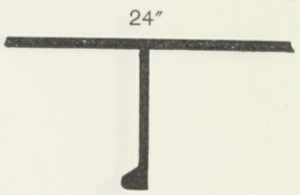


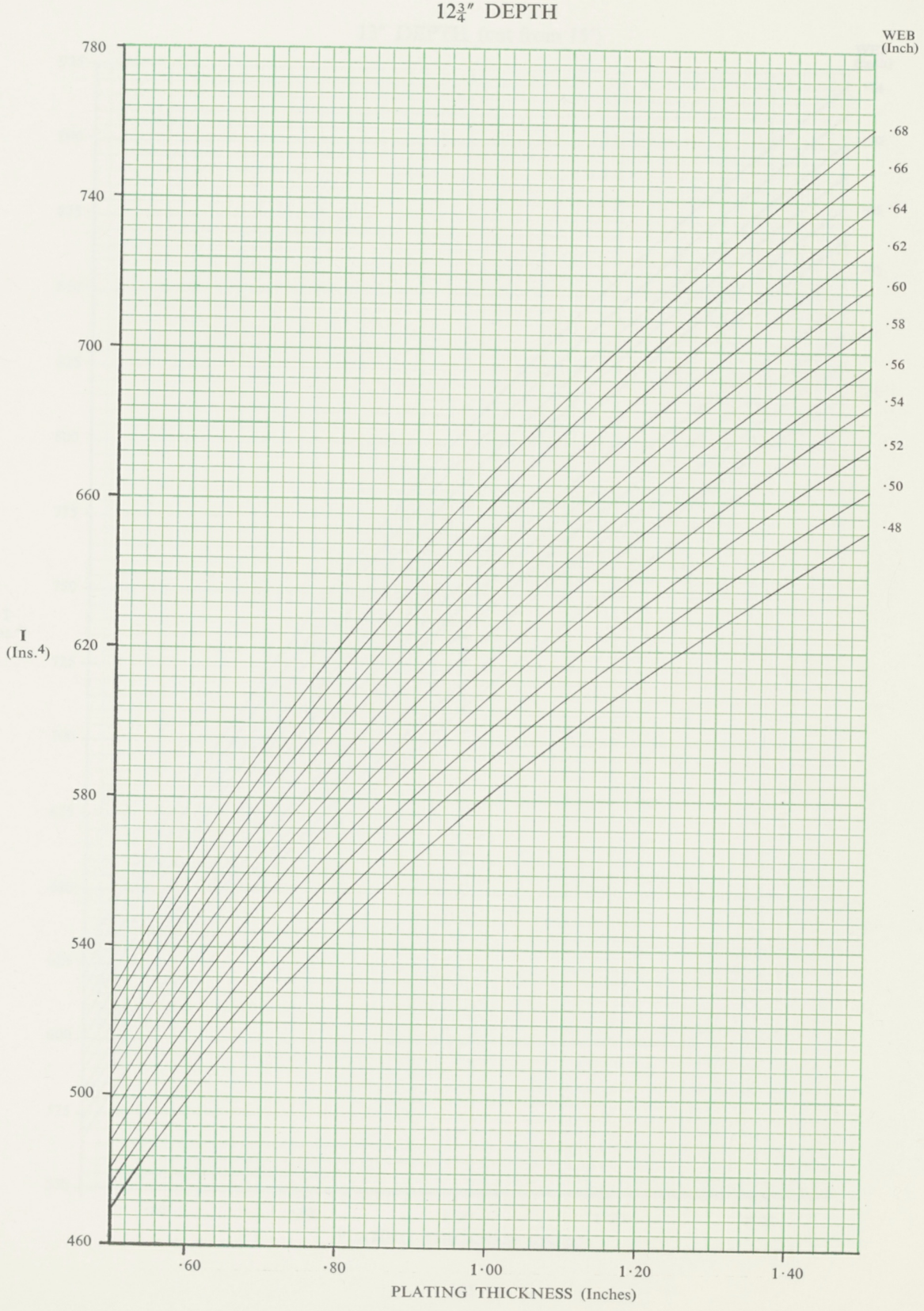
12″ DEPTH (cut from 15″)



MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

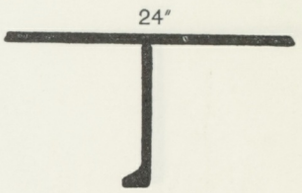
(WITH PLATING)



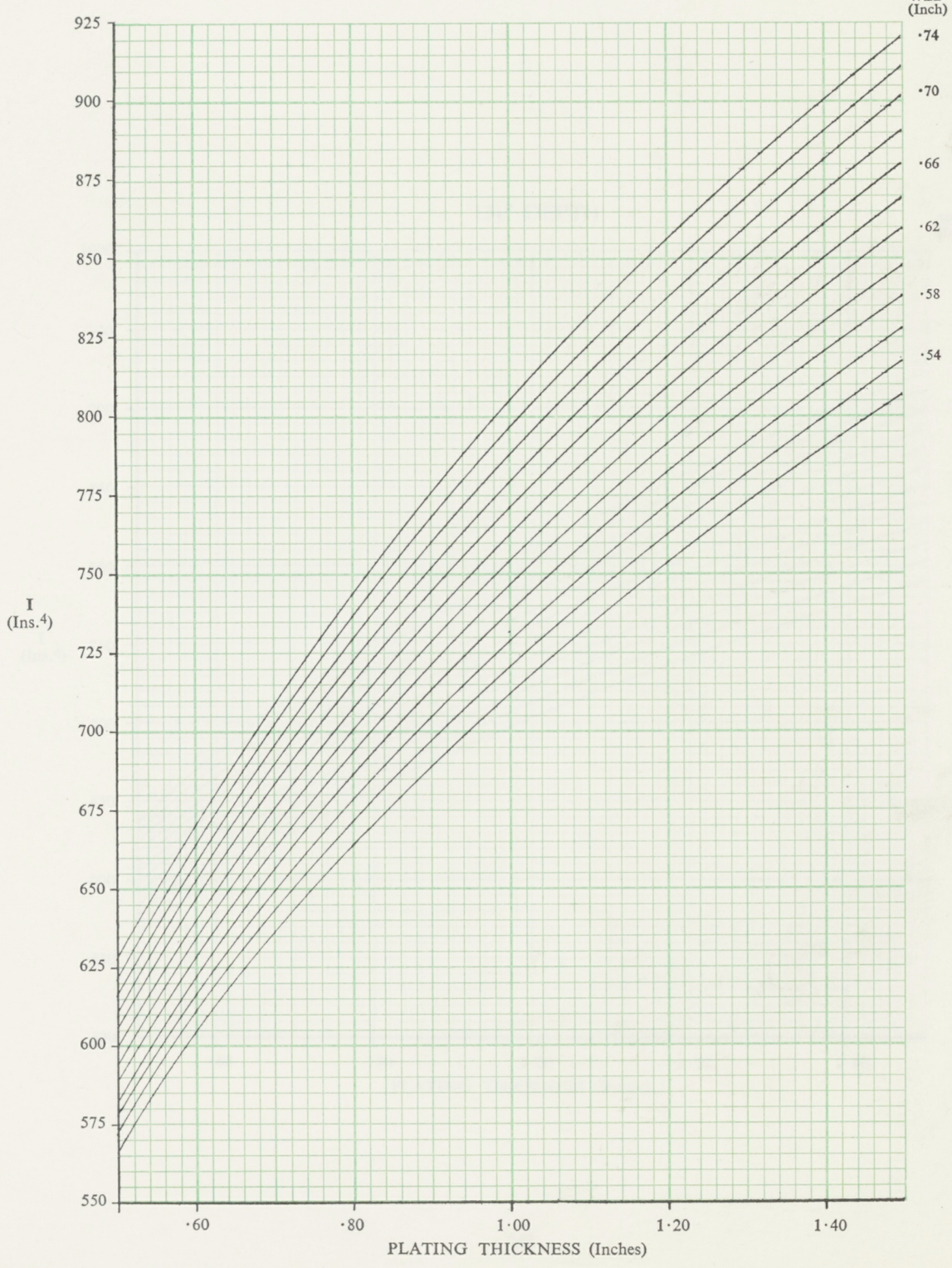


MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



13″ DEPTH (cut from 15″)



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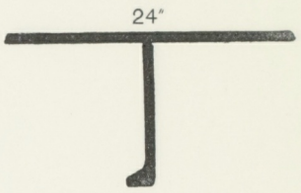
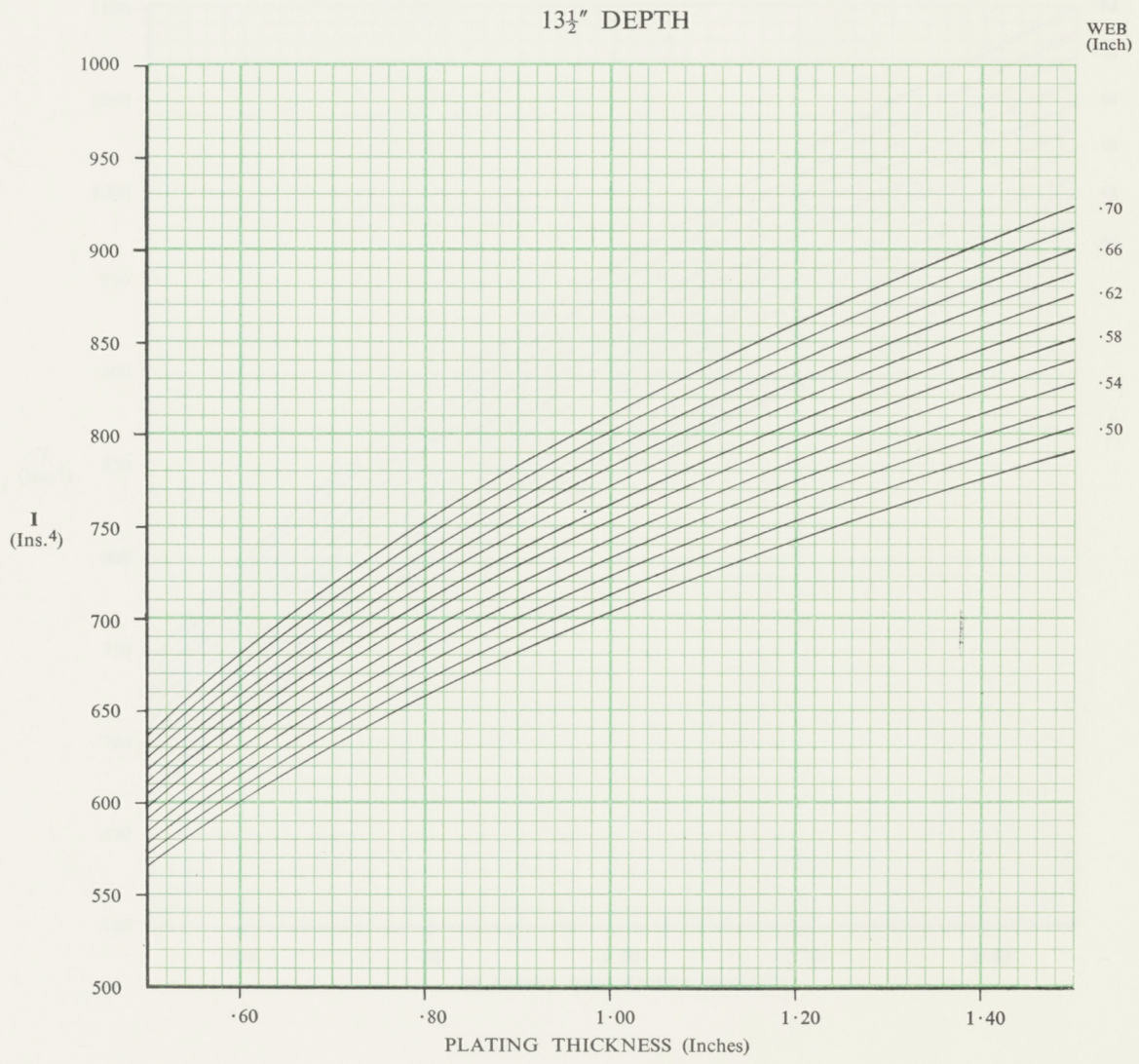
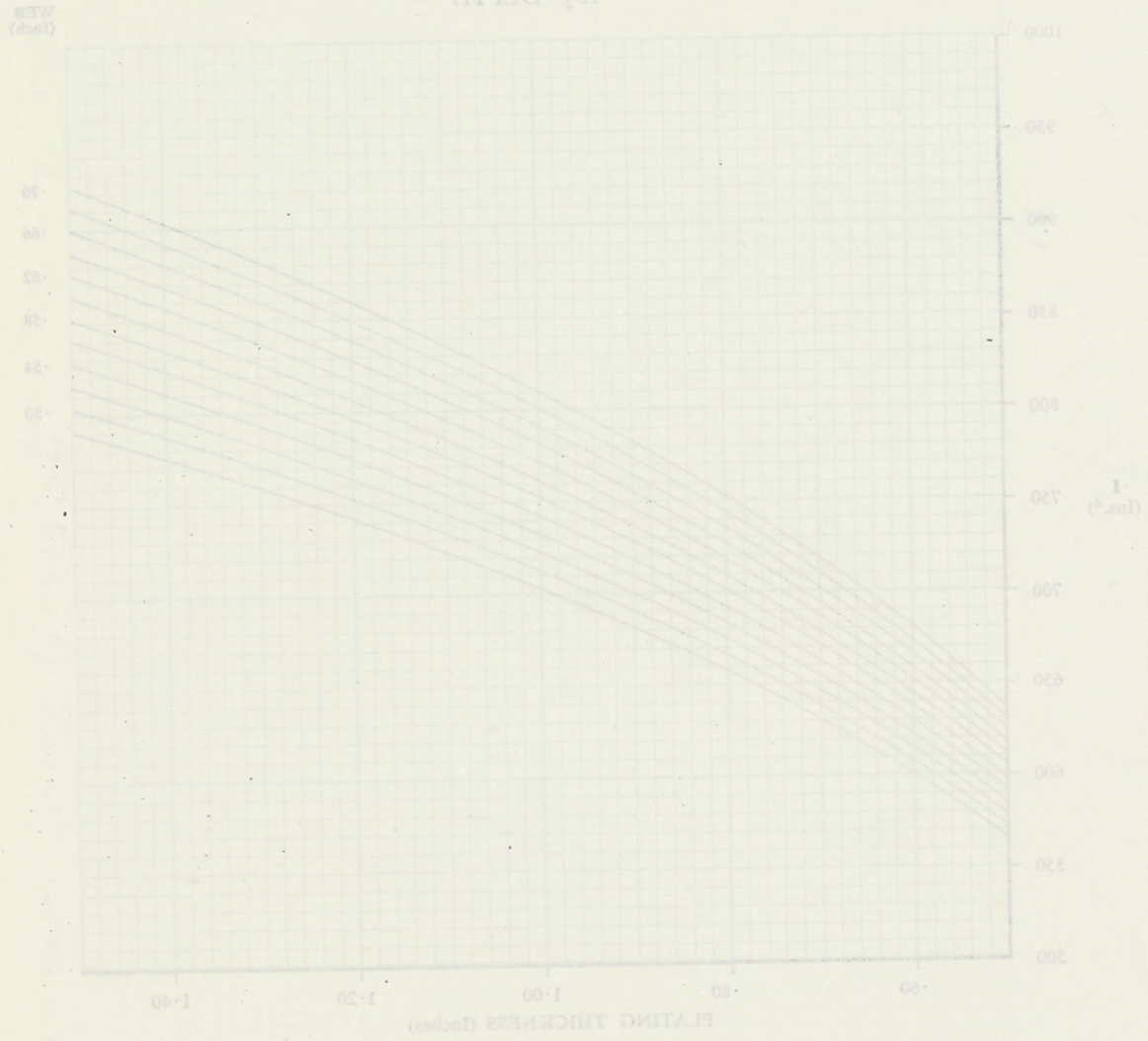
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)

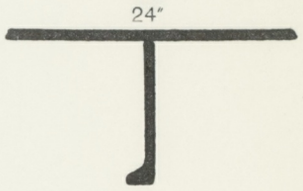




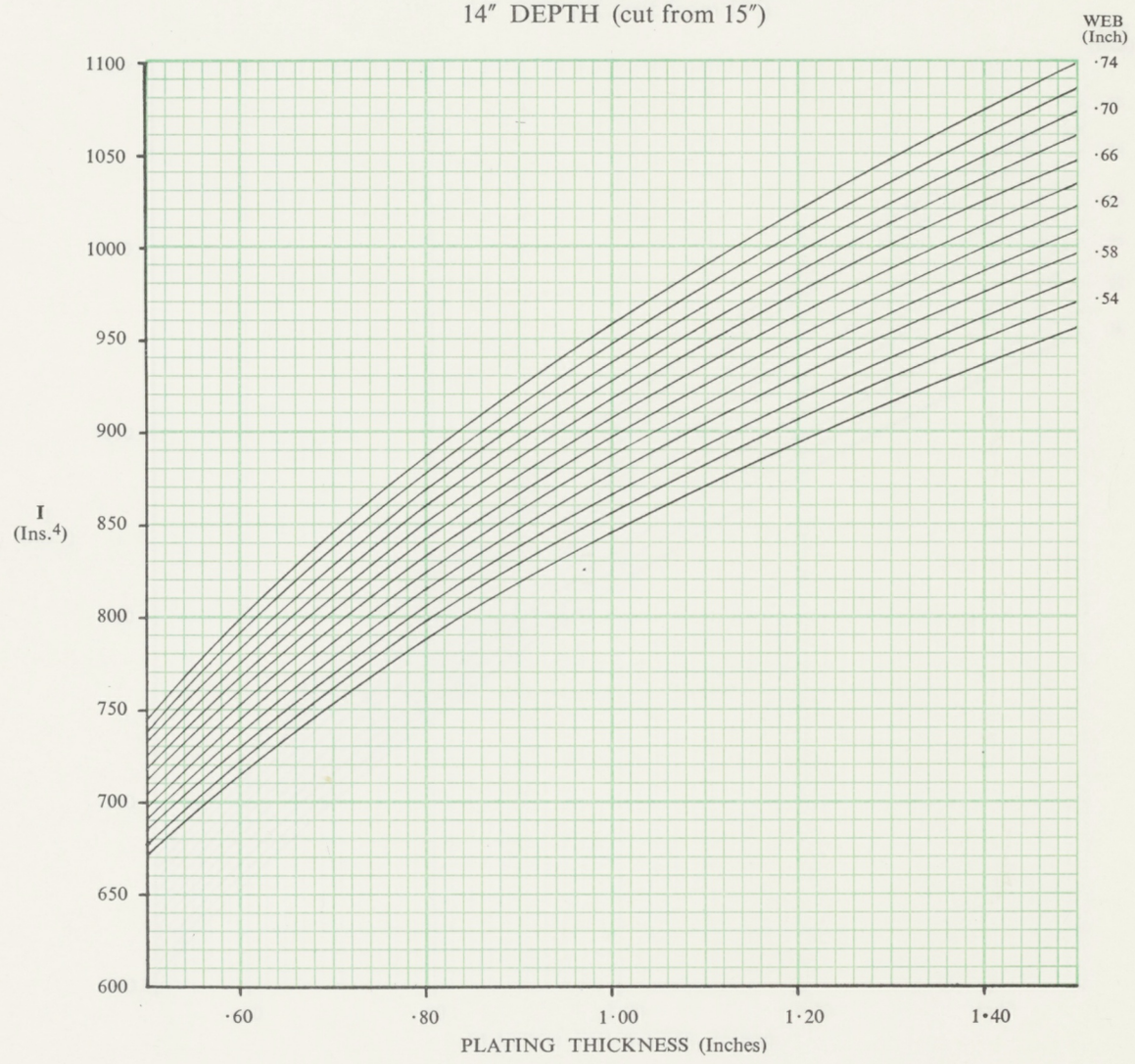


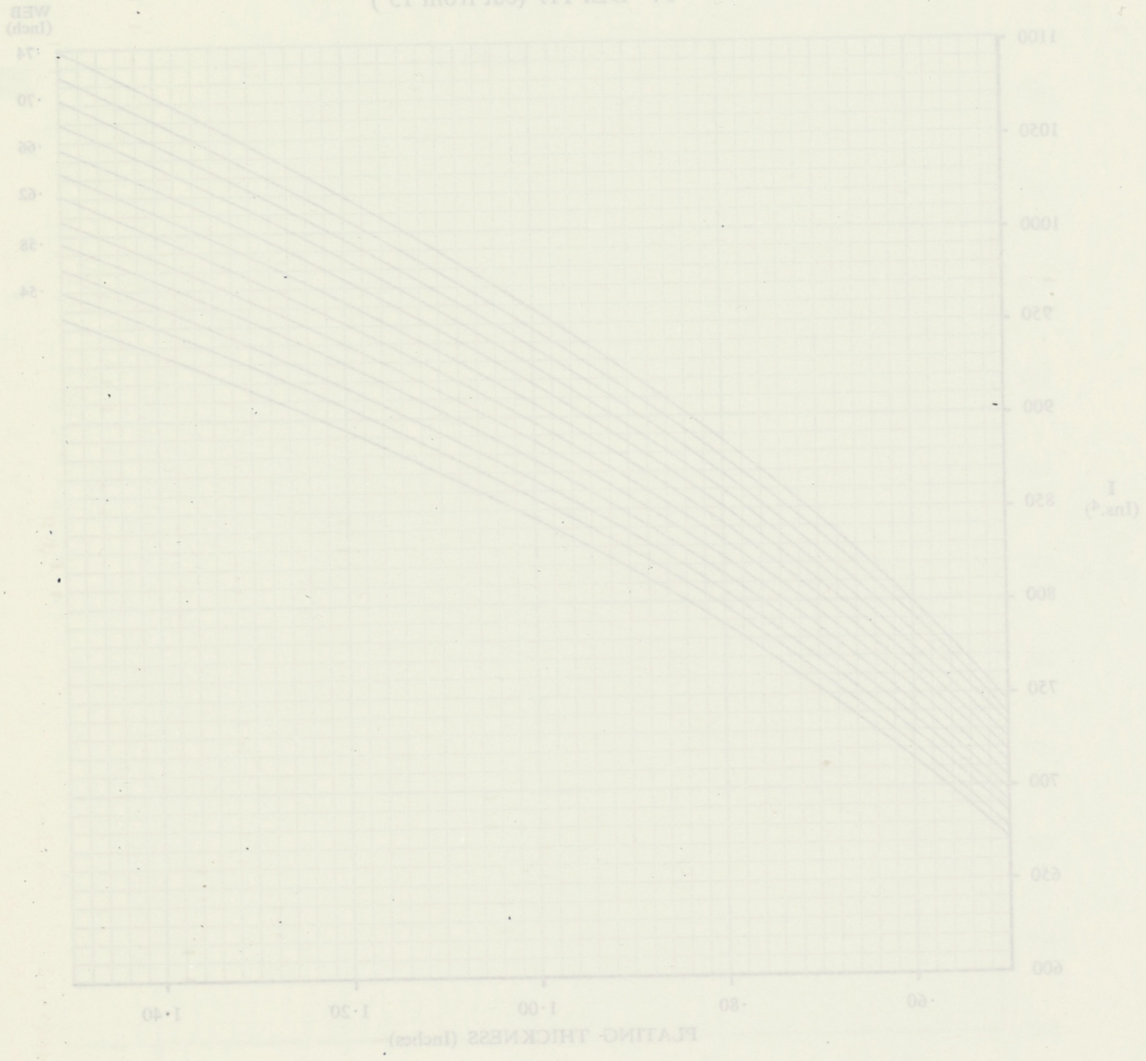
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



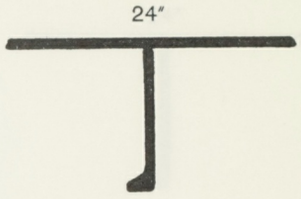
14″ DEPTH (cut from 15″)



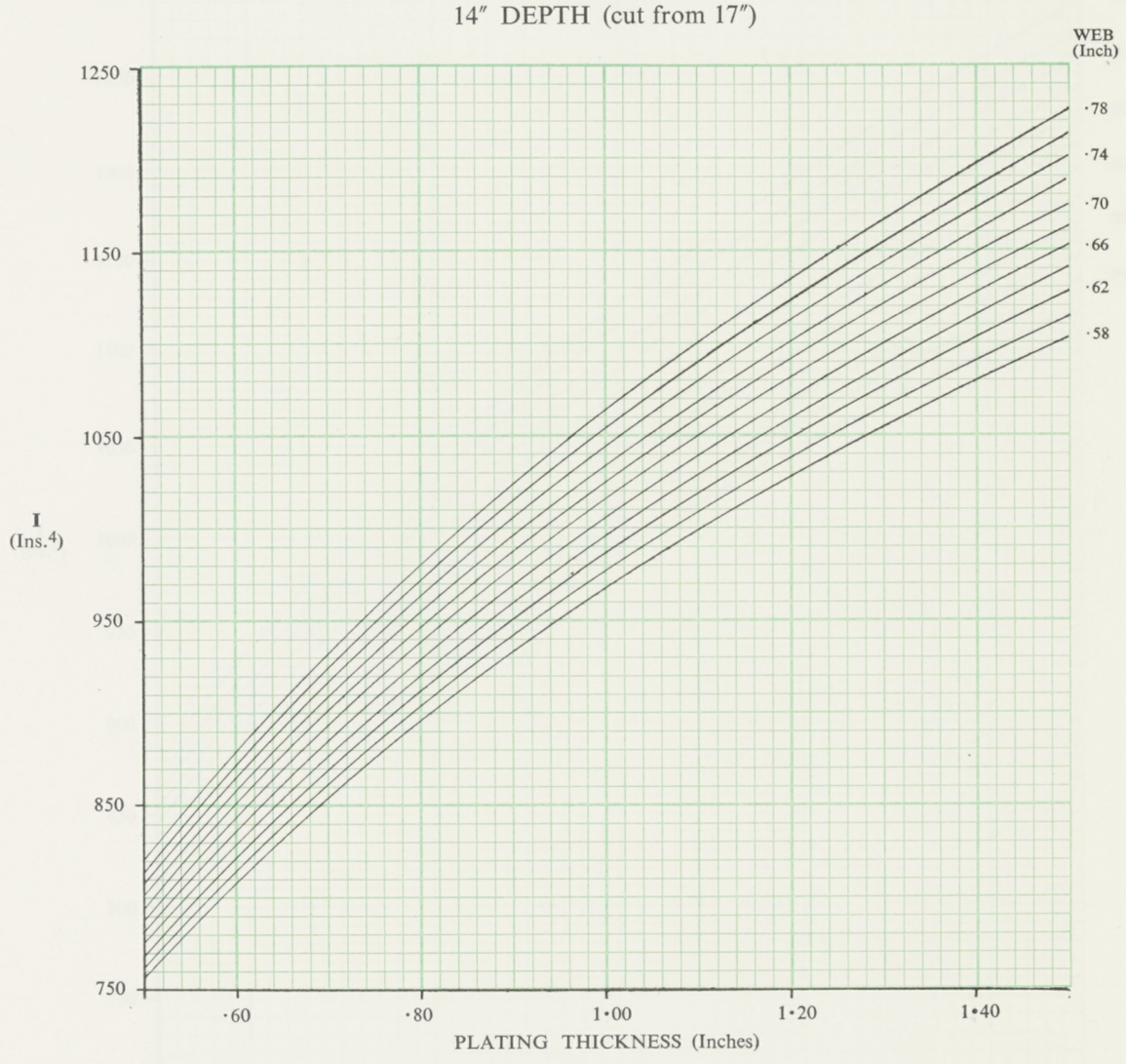


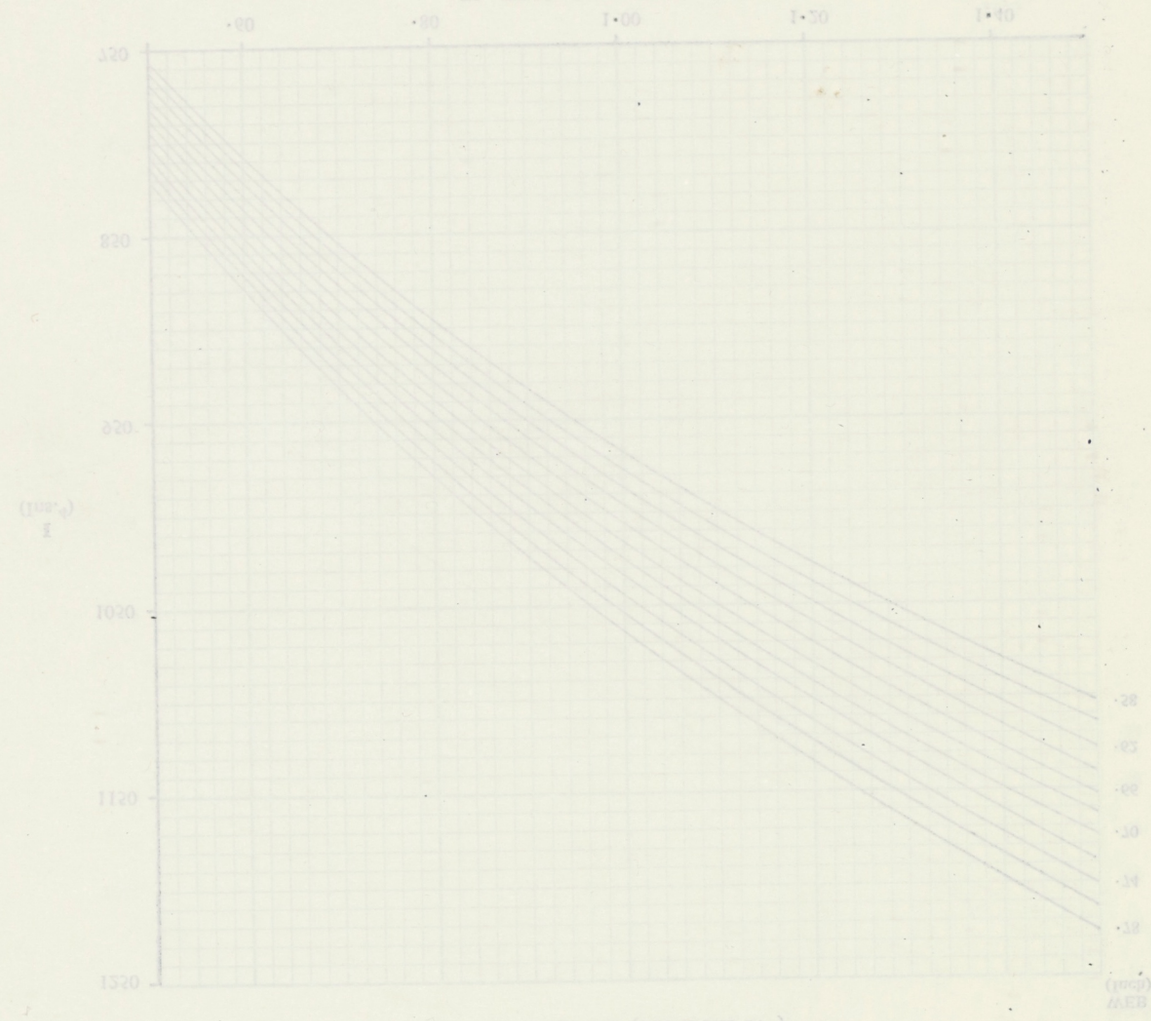
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



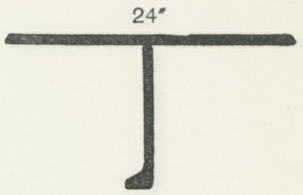
14″ DEPTH (cut from 17″)





MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



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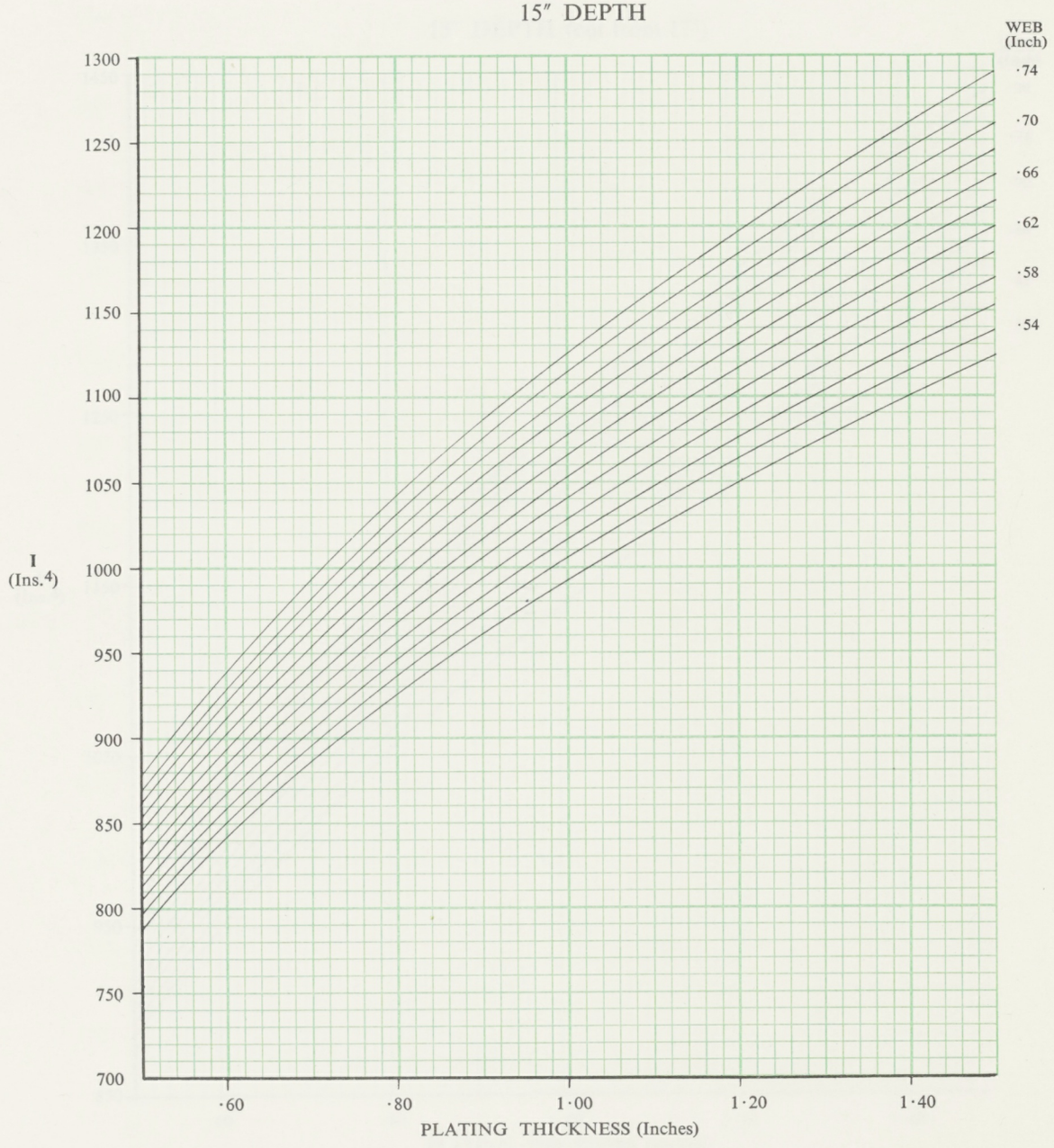
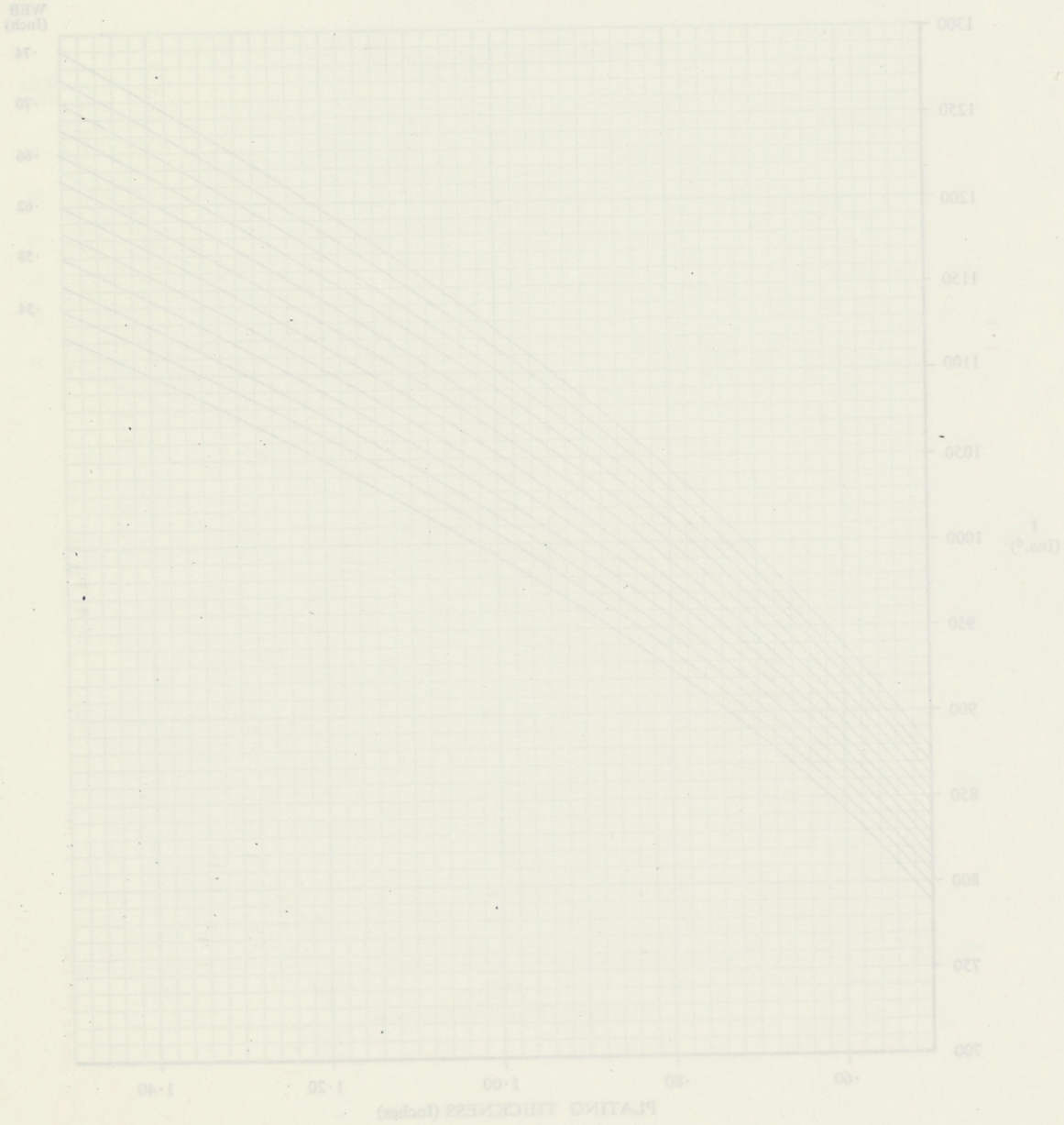
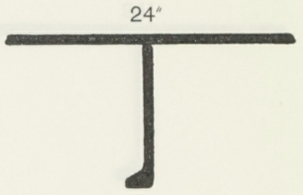


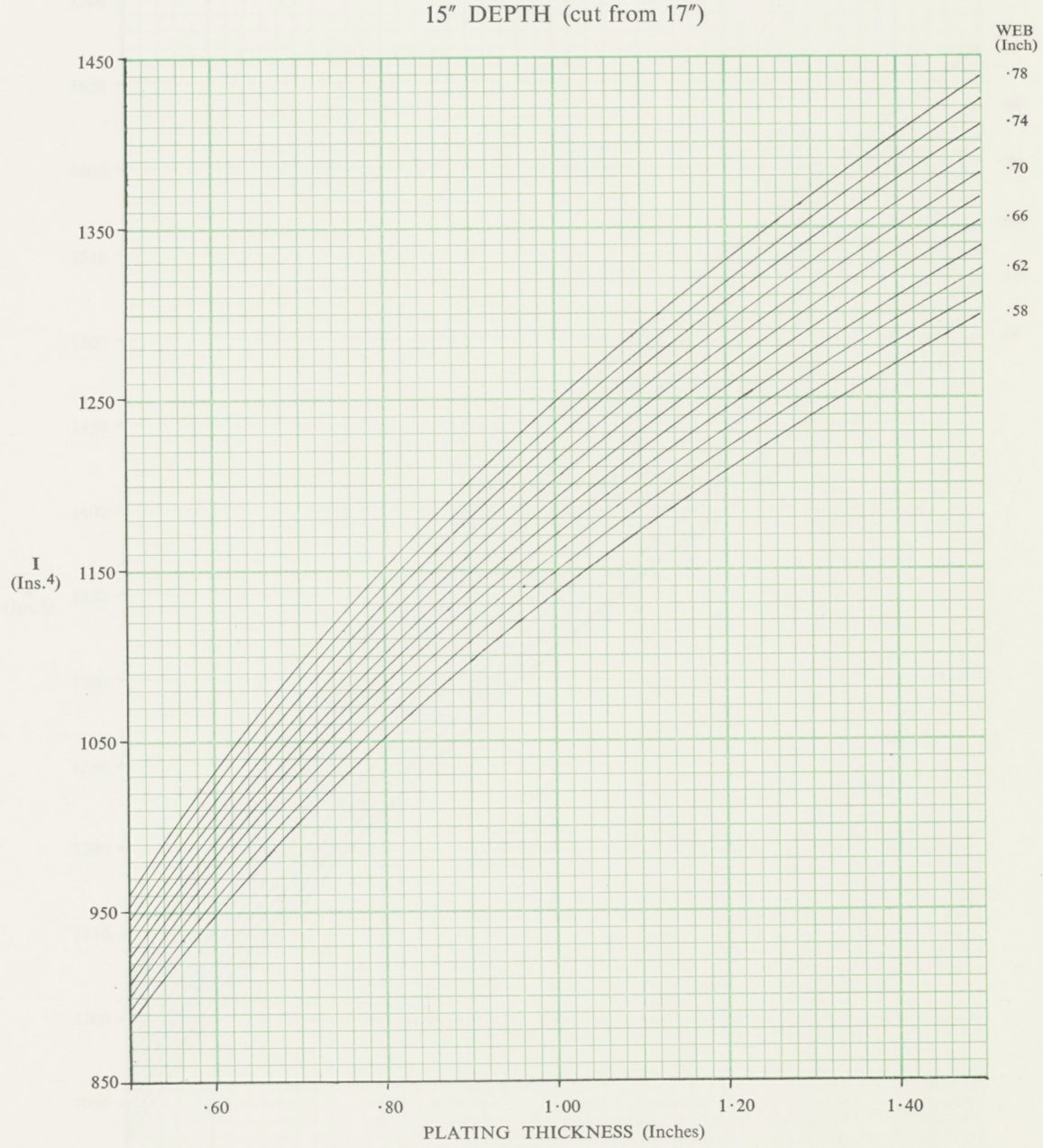


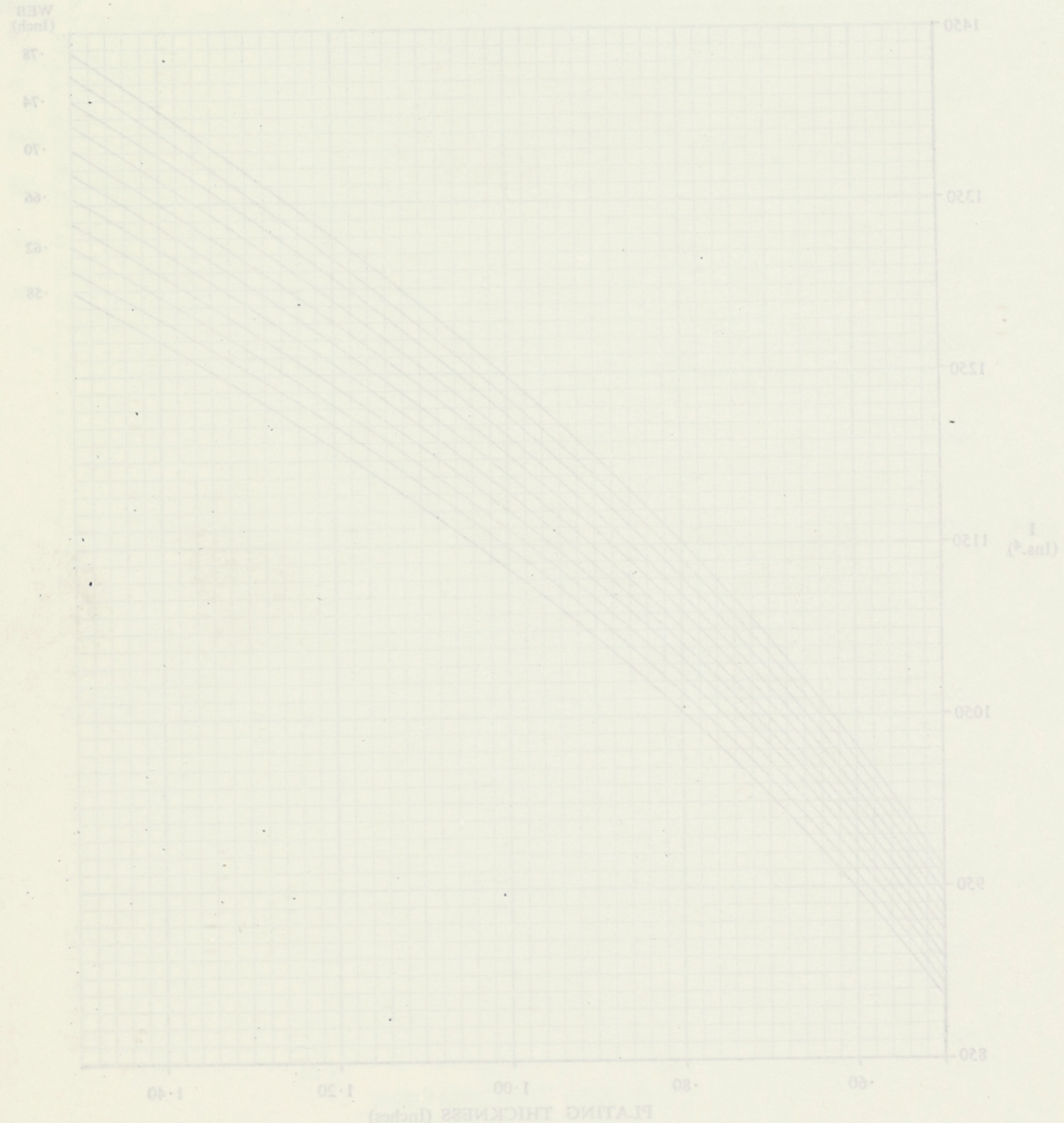
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



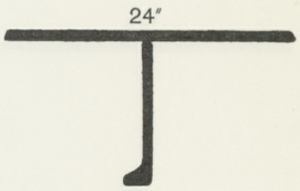
15″ DEPTH (cut from 17″)



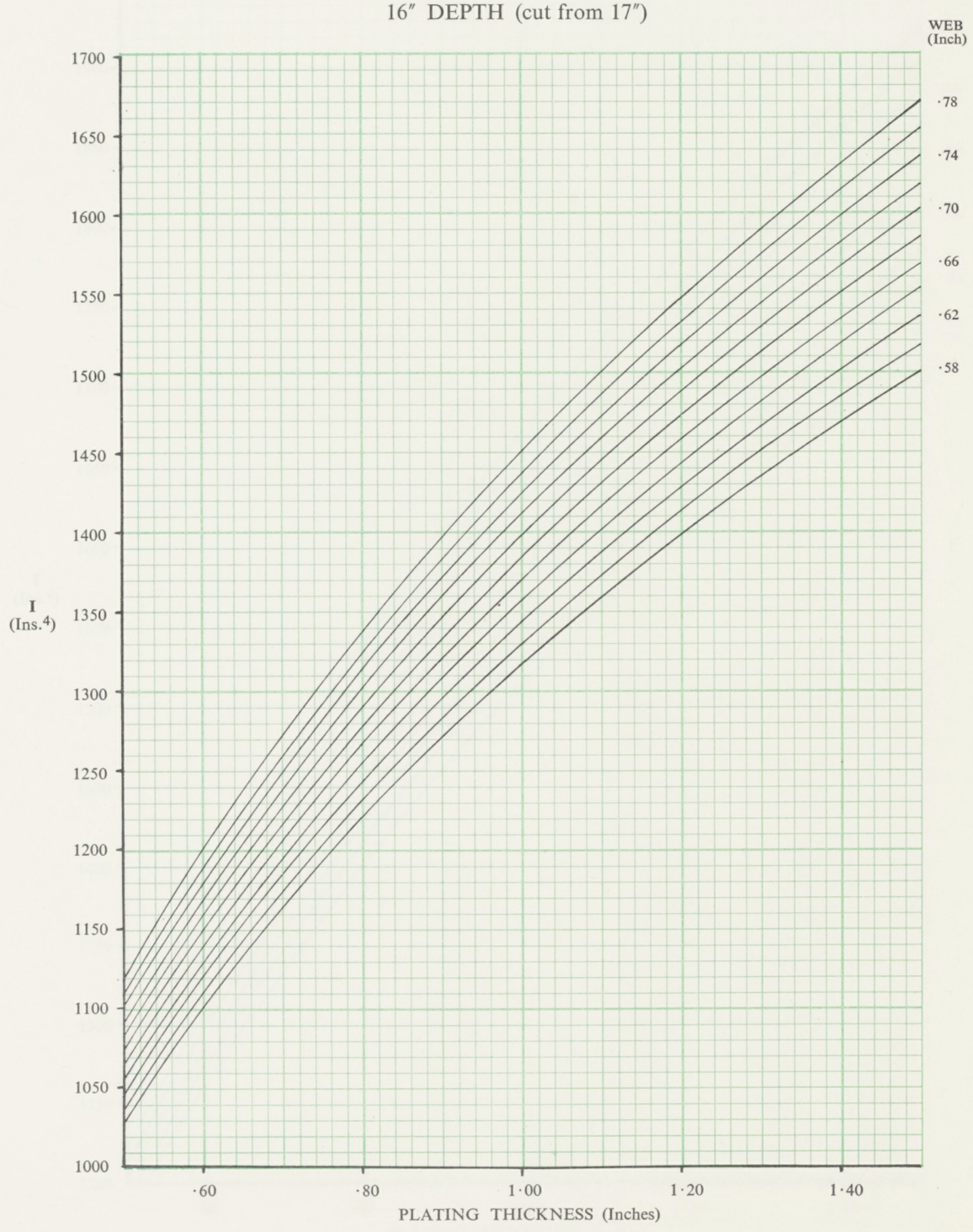


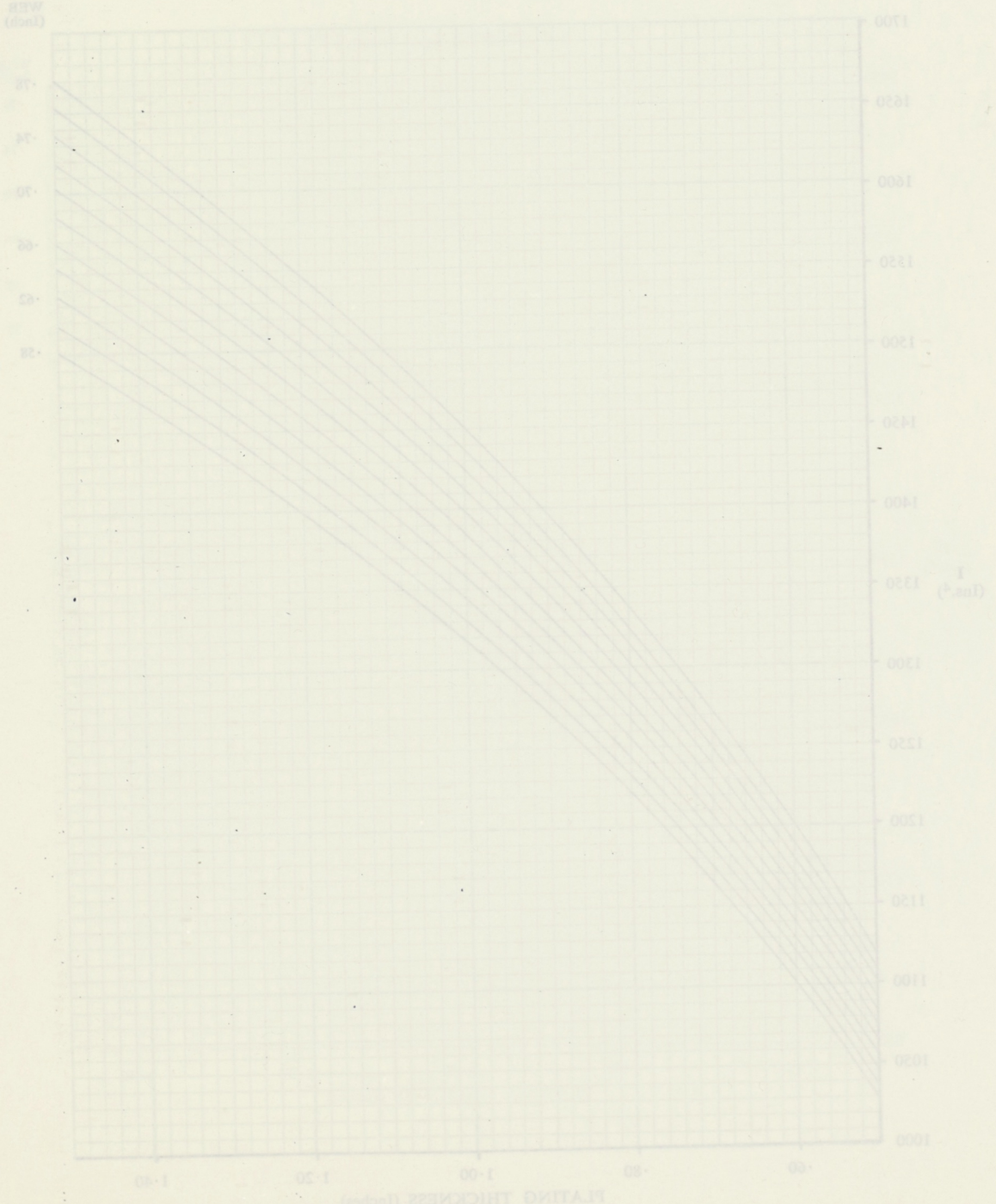
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



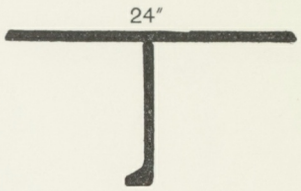
16″ DEPTH (cut from 17″)



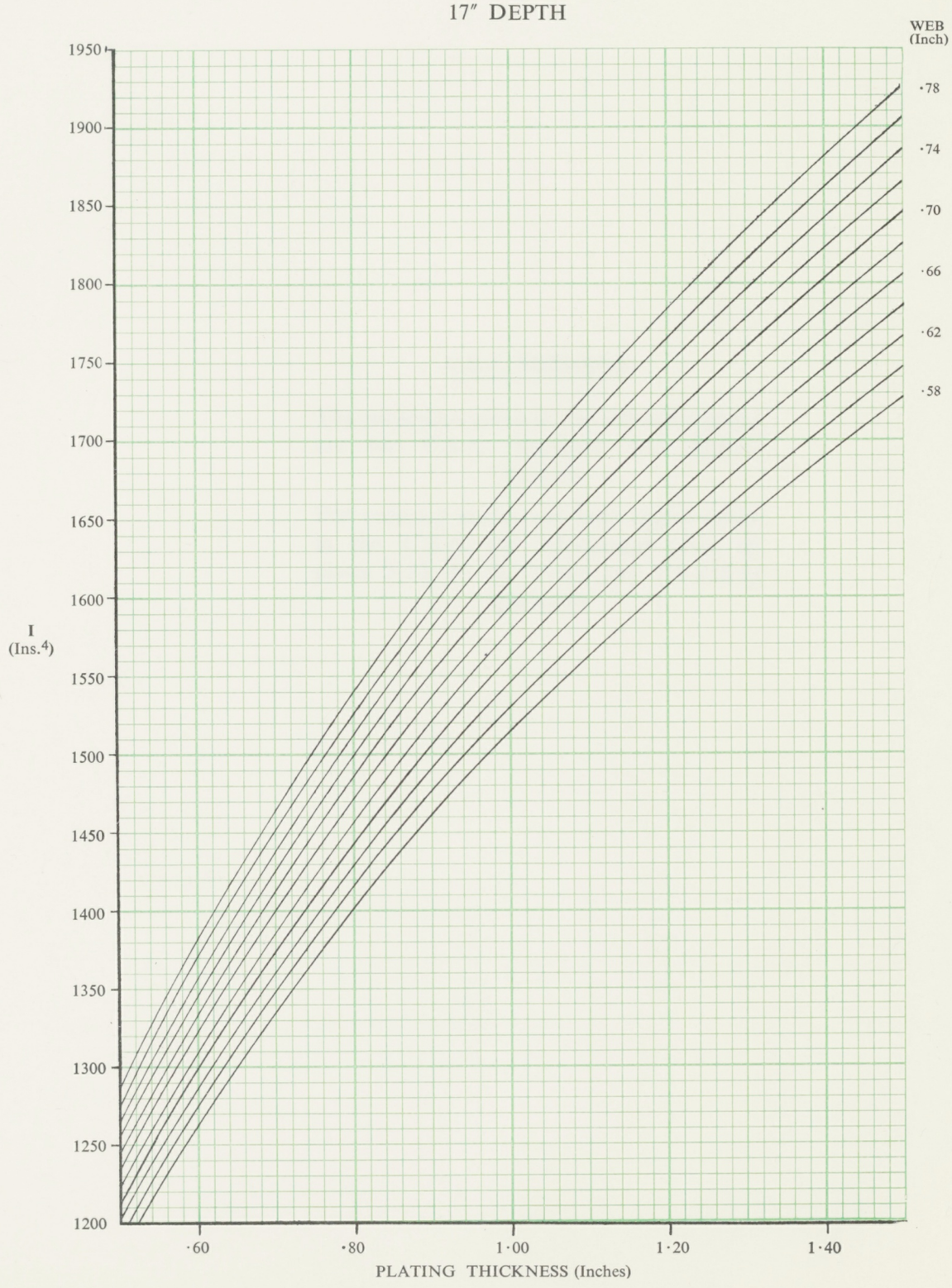


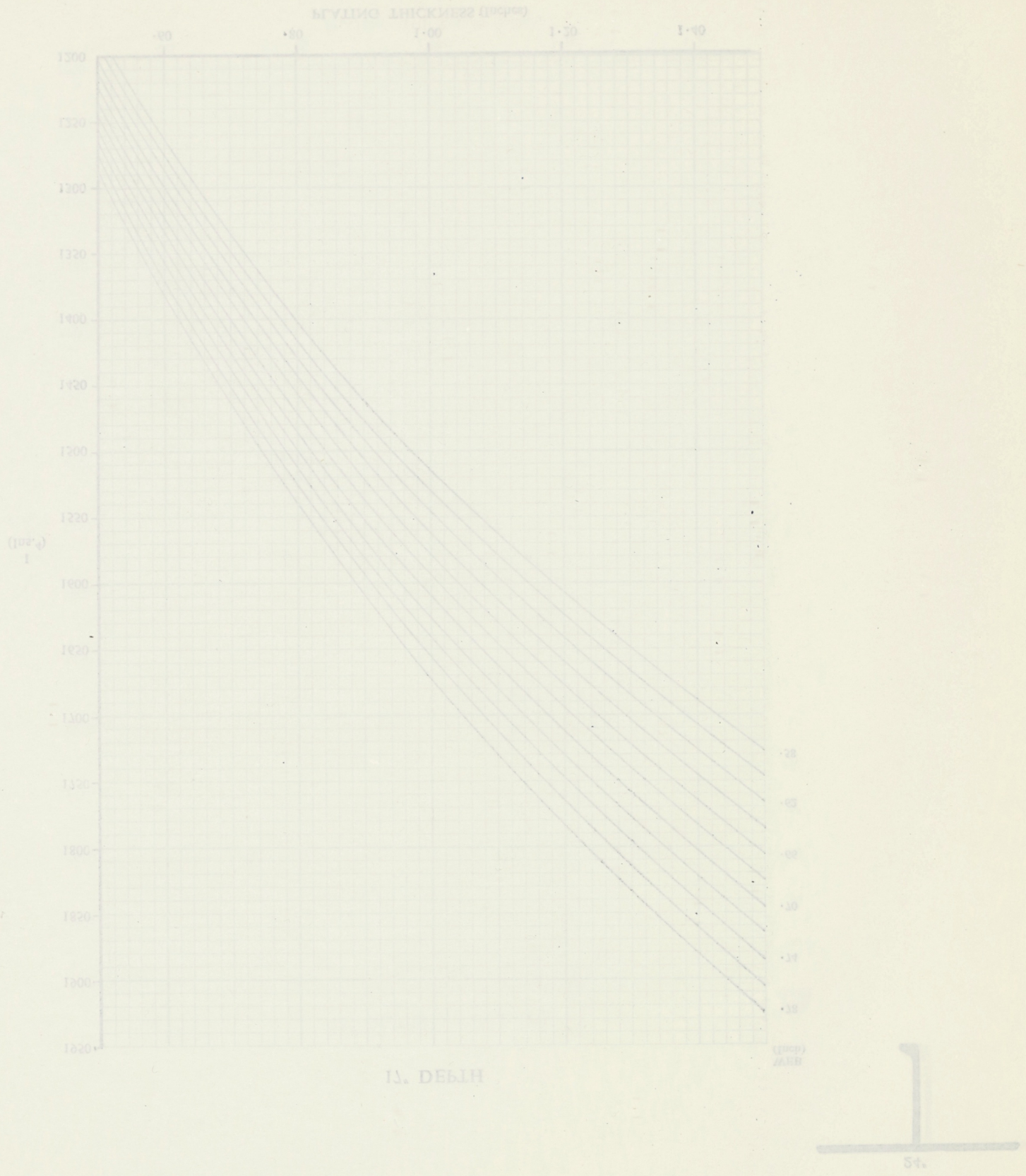
MOMENT OF INERTIA OF ONE-SIDED BULB PLATES

(WITH PLATING)



17″ DEPTH





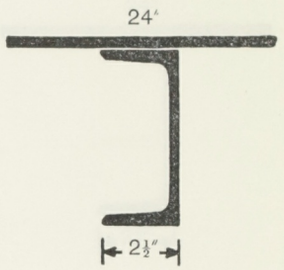
U.S.A. SECTIONS

The particulars given in the following plates are for U.S.A. Standard and Special Channels

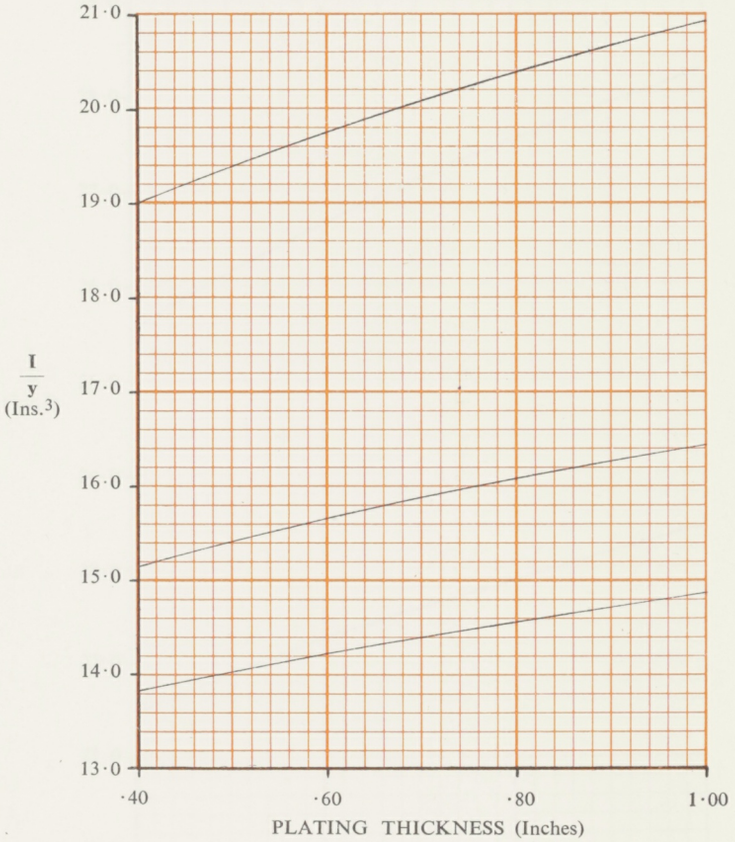
For ordinary angles and bulb angles rolled in the U.S.A. the information given in plates 5–33, 48–59, 77–105 and 118–132 is applicable

SECTION MODULUS AND AREA OF CHANNELS

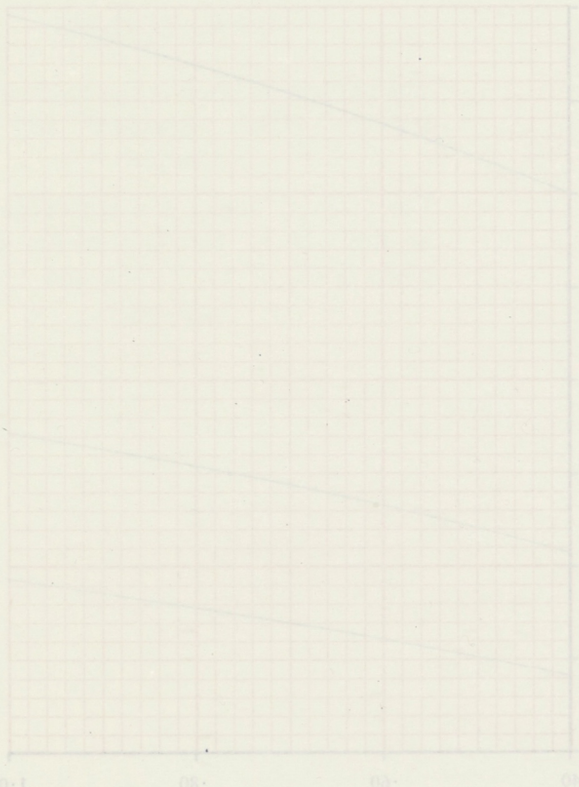
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



2½" FLANGE



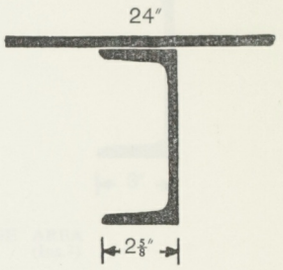
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
9	·448	·413	5·86
9	·285	·413	4·39
9	·230	·413	3·89

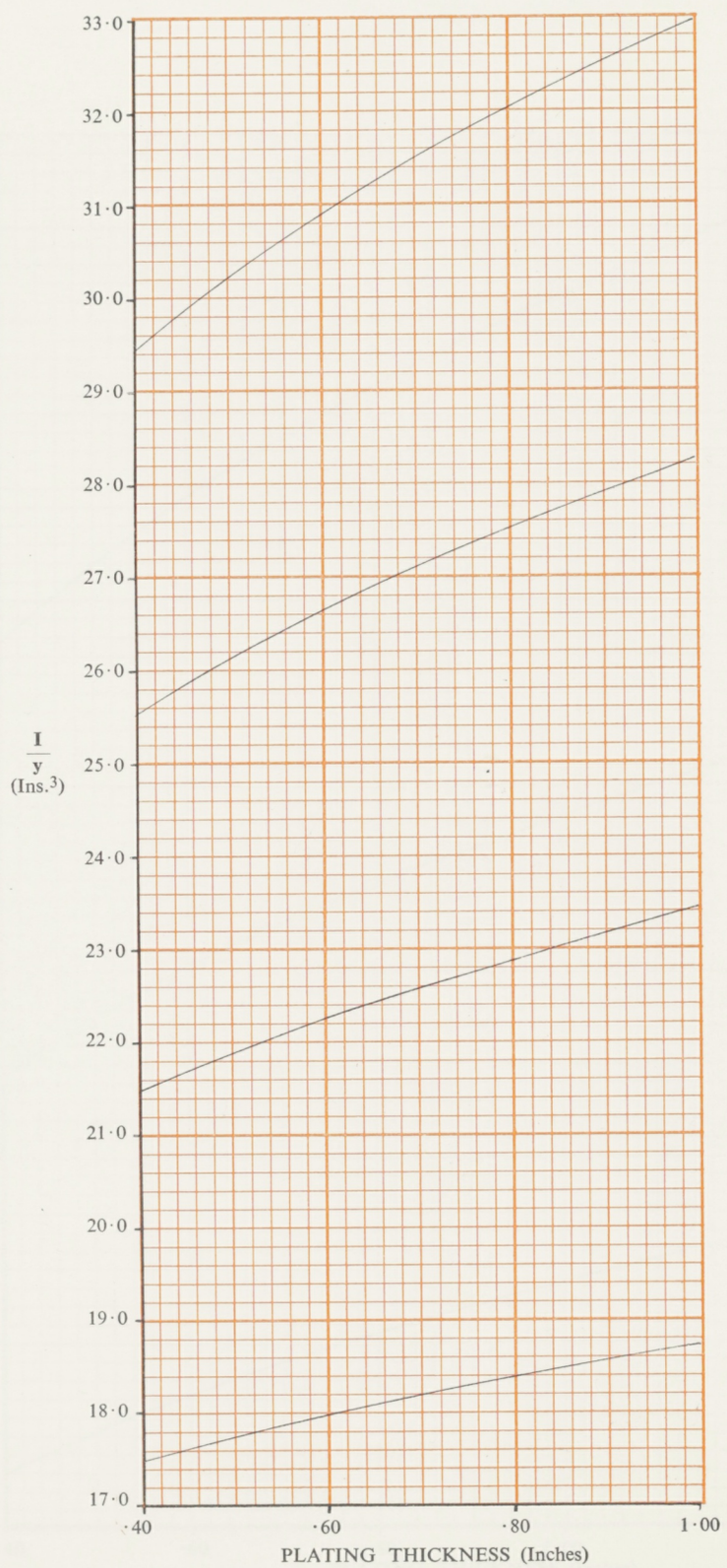


SECTION MODULUS AND AREA OF CHANNELS

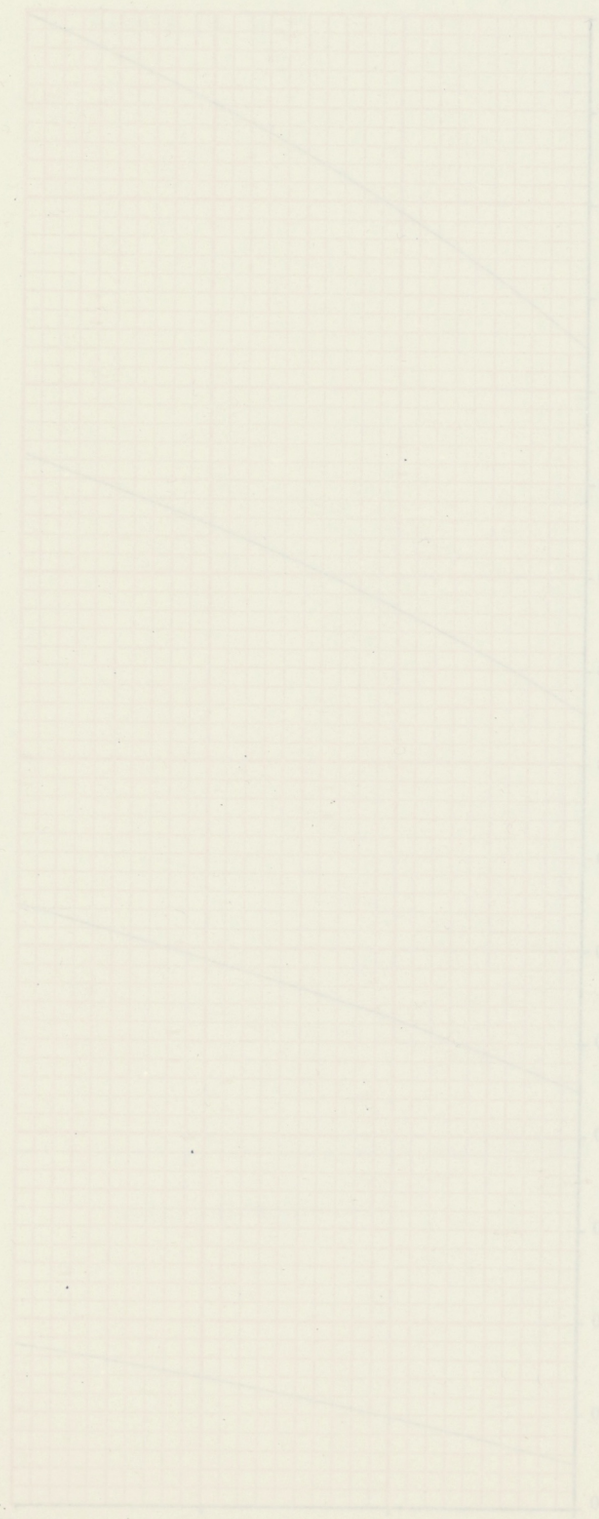
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)

$2\frac{5}{8}$″ FLANGE



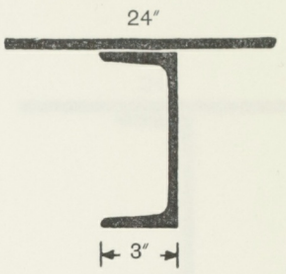


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
10	·673	·436	8·80
10	·526	·436	7·33
10	·379	·436	5·86
10	·240	·436	4·47

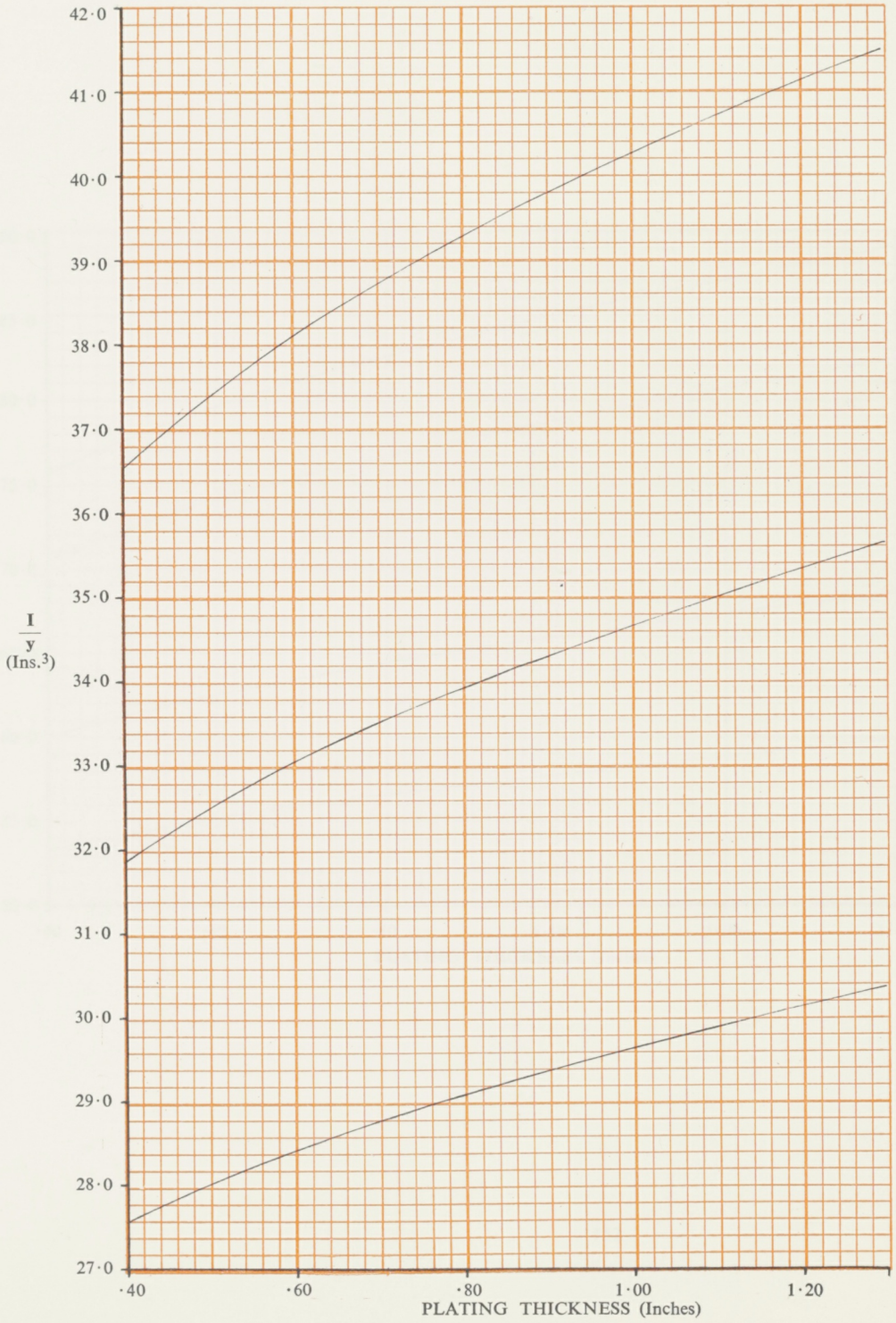


SECTION MODULUS AND AREA OF CHANNELS

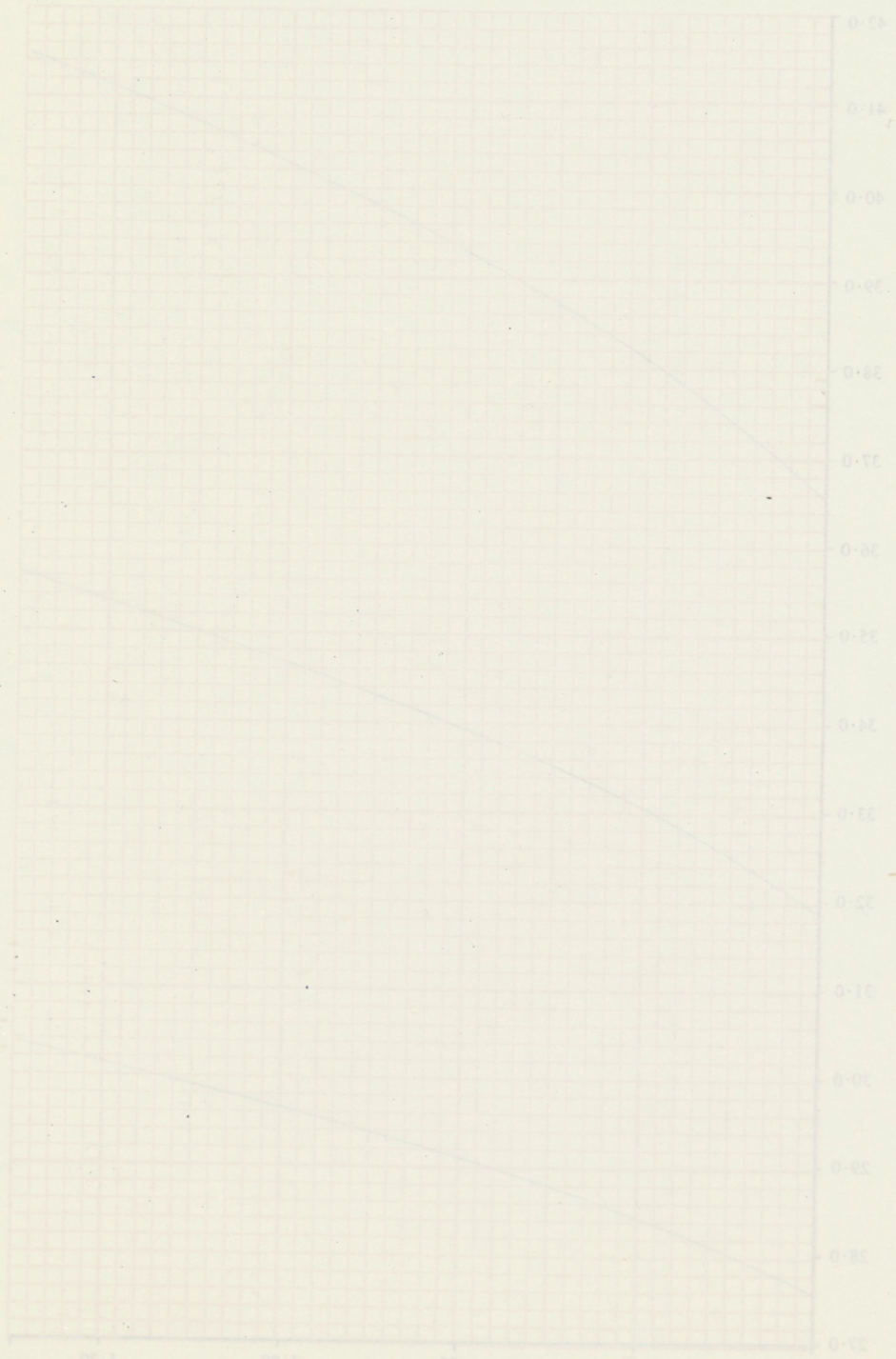
SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3″ FLANGE

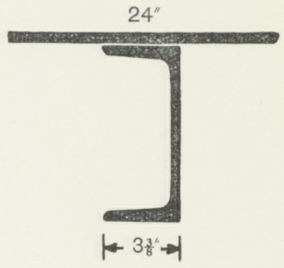


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
12	·510	·501	8·79
12	·387	·501	7·32
12	·280	·501	6·05

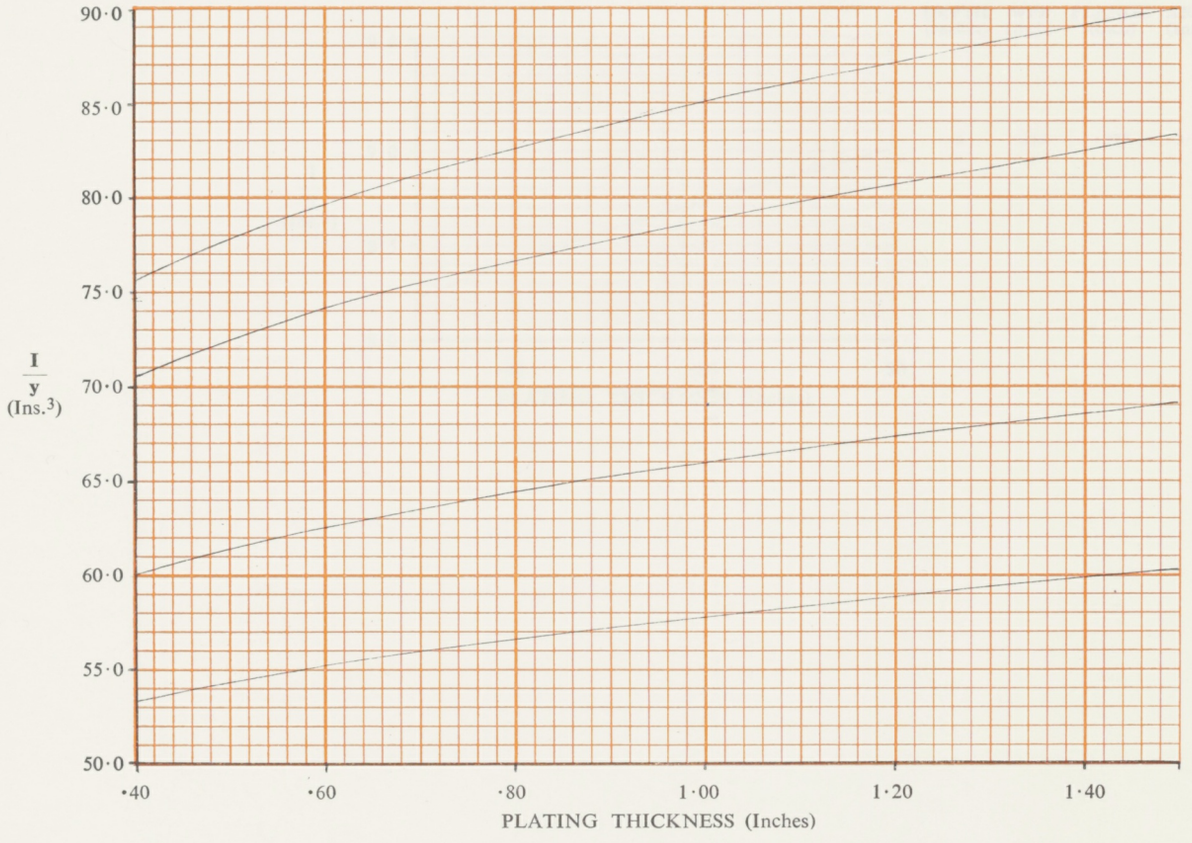


SECTION MODULUS AND AREA OF CHANNELS

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



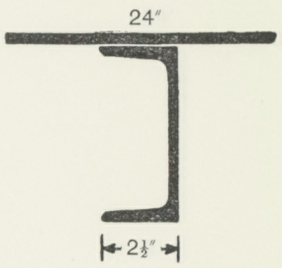
3⅜″ FLANGE



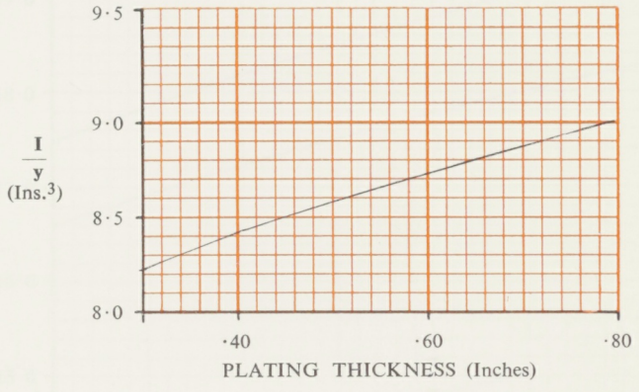
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.²)
15	·814	·650	16·11
15	·716	·650	14·64
15	·520	·650	11·70
15	·400	·650	9·90

SECTION MODULUS AND AREA OF CHANNELS

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



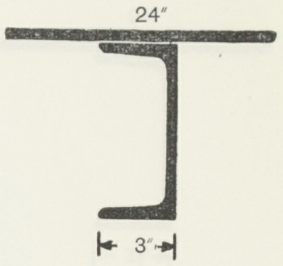
2½″ FLANGE



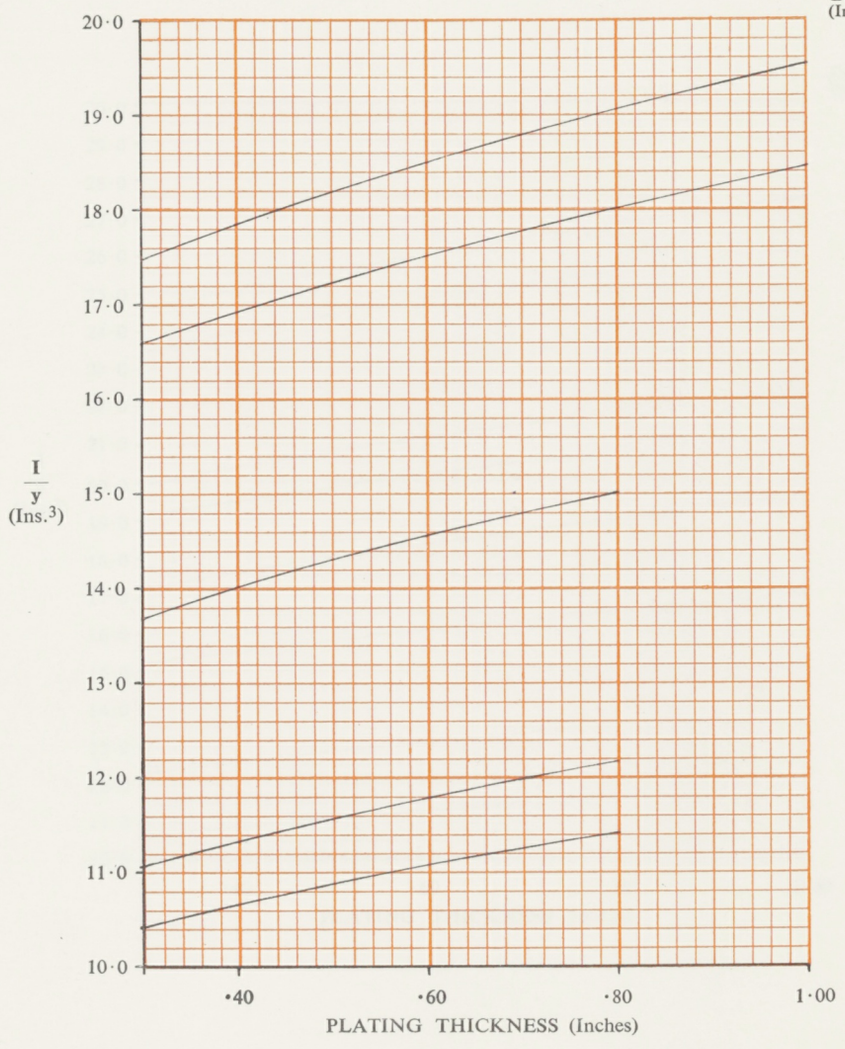
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
6	·313	·375	3·52

SECTION MODULUS AND AREA OF CHANNELS

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



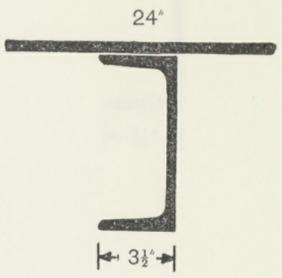
3″ FLANGE



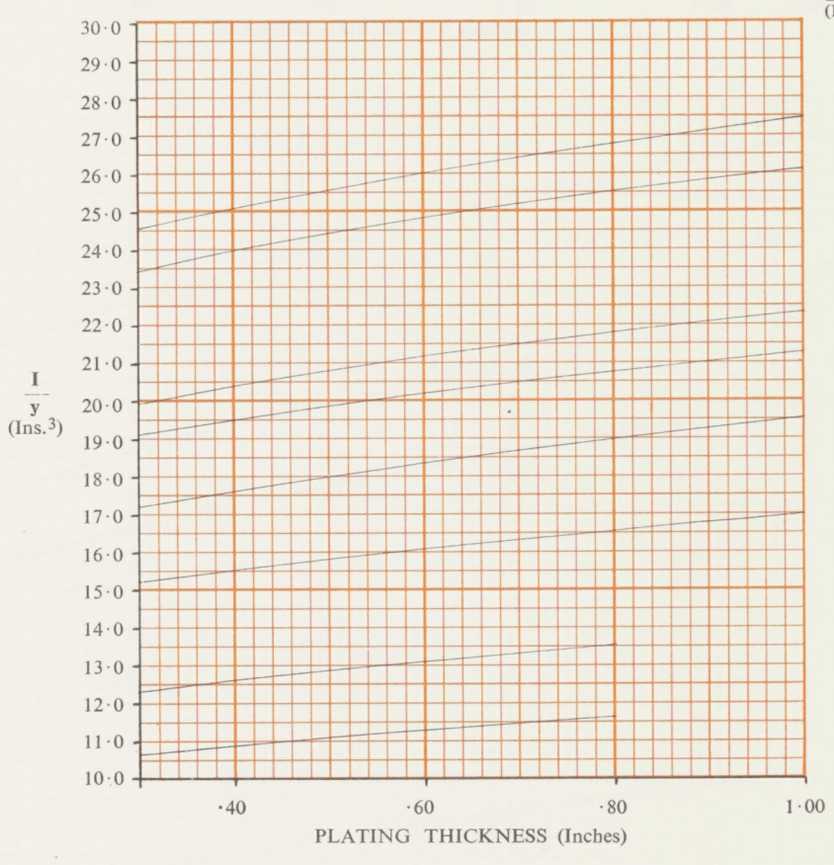
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
8	·400	·500	5·83
8	·350	·500	5·43
7	·375	·475	5·12
6	·375	·475	4·75
6	·313	·475	4·37

SECTION MODULUS AND AREA OF CHANNELS

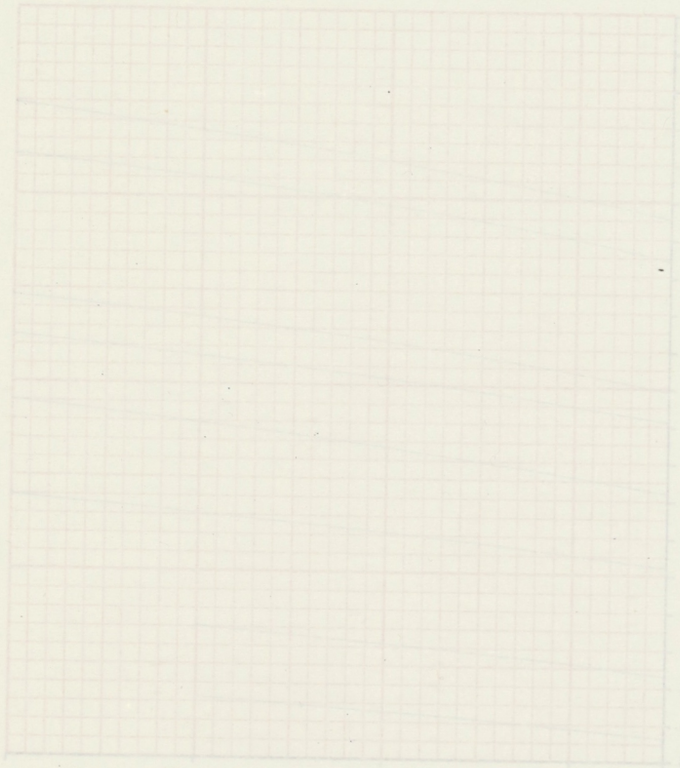
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE

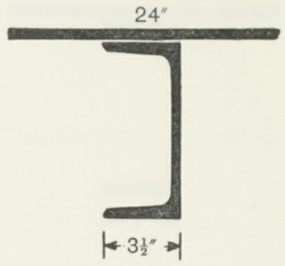


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
9	·450	·550	7·41
9	·400	·550	6·96
8	·425	·525	6·63
8	·375	·525	6·23
7	·500	·500	6·60
7	·350	·500	5·55
6	·375	·475	5·22
6	·340	·385	4·47

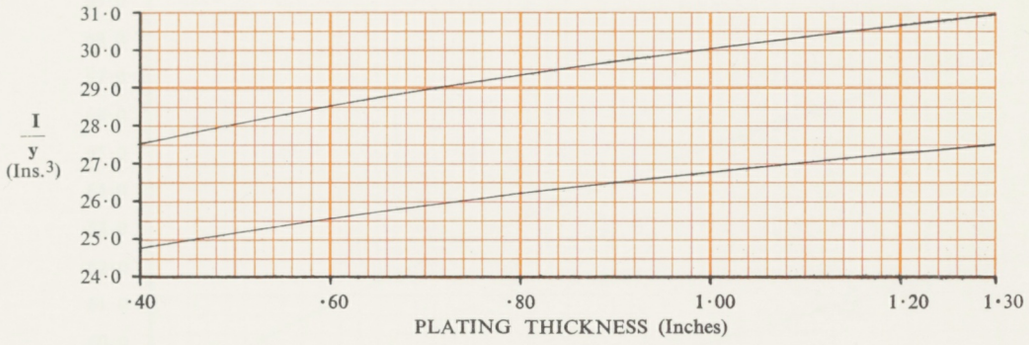


SECTION MODULUS AND AREA OF CHANNELS

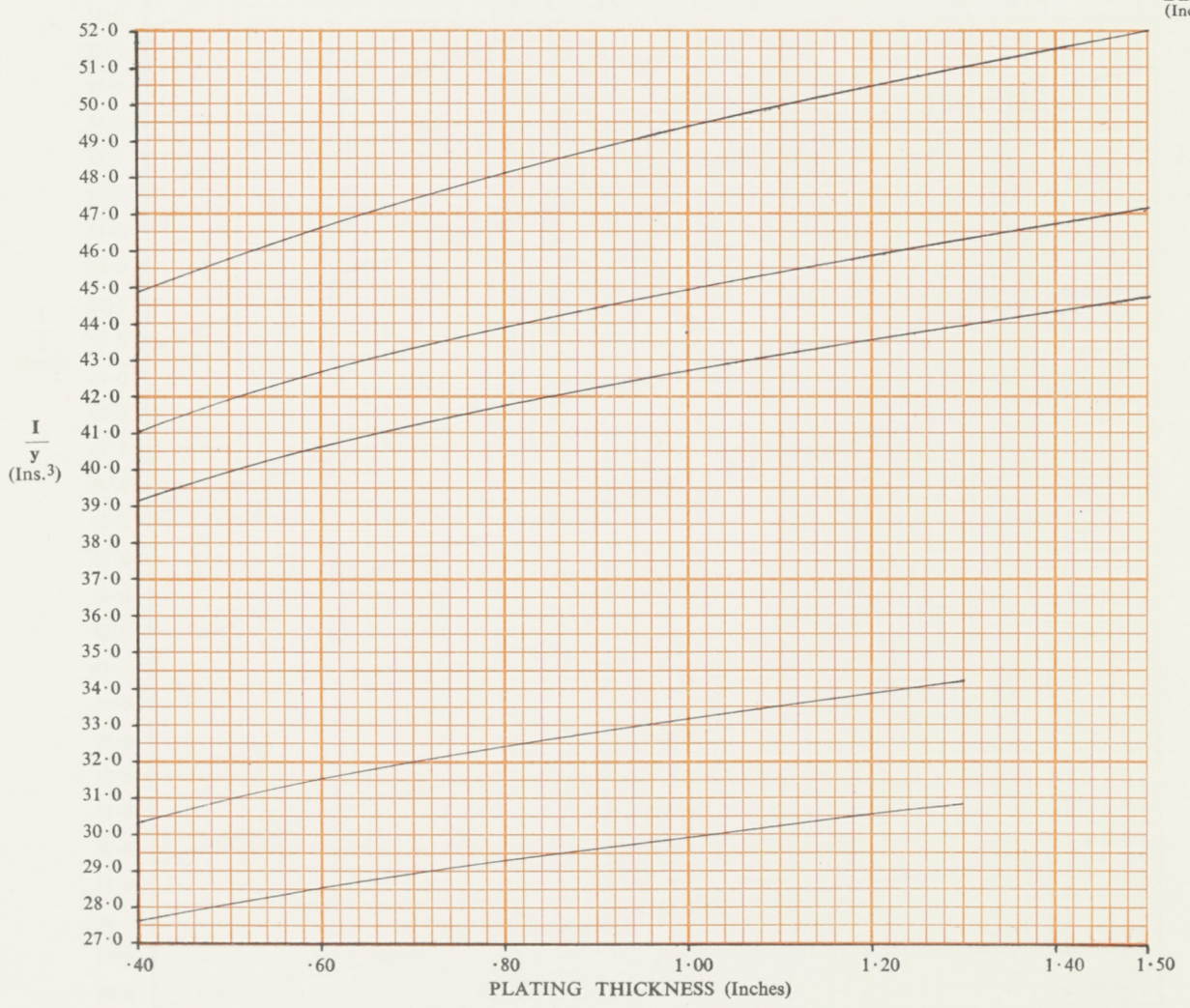
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



3½″ FLANGE



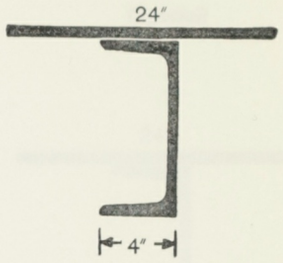
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
10	·425	·500	7·38
10	·325	·500	6·38



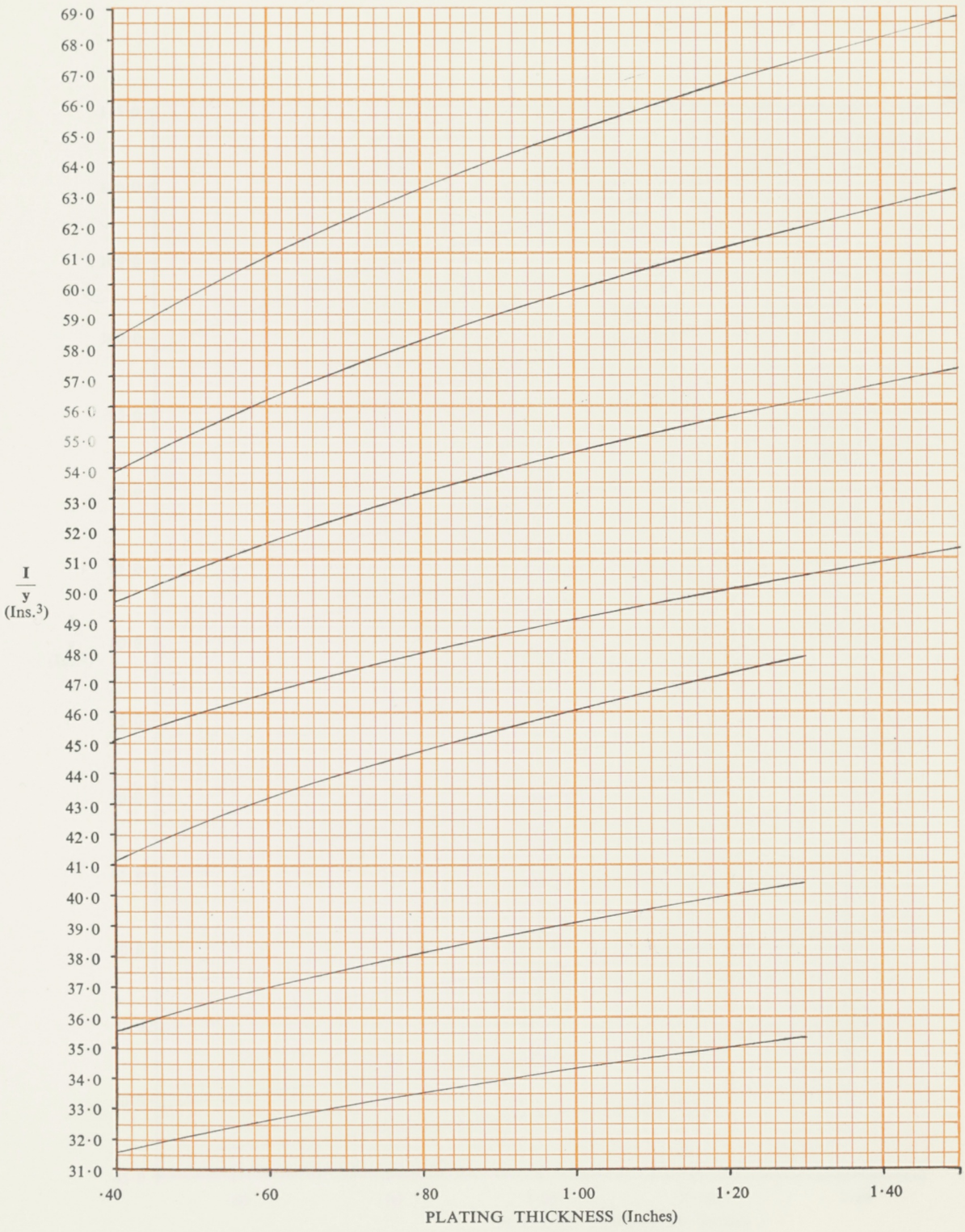
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
12	·600	·600	10·8
12	·500	·600	9·60
12	·450	·600	9·00
10	·475	·575	8·23
10	·375	·575	7·23

SECTION MODULUS AND AREA OF CHANNELS

(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



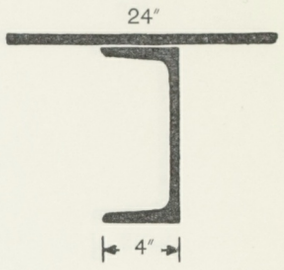
4″ FLANGE



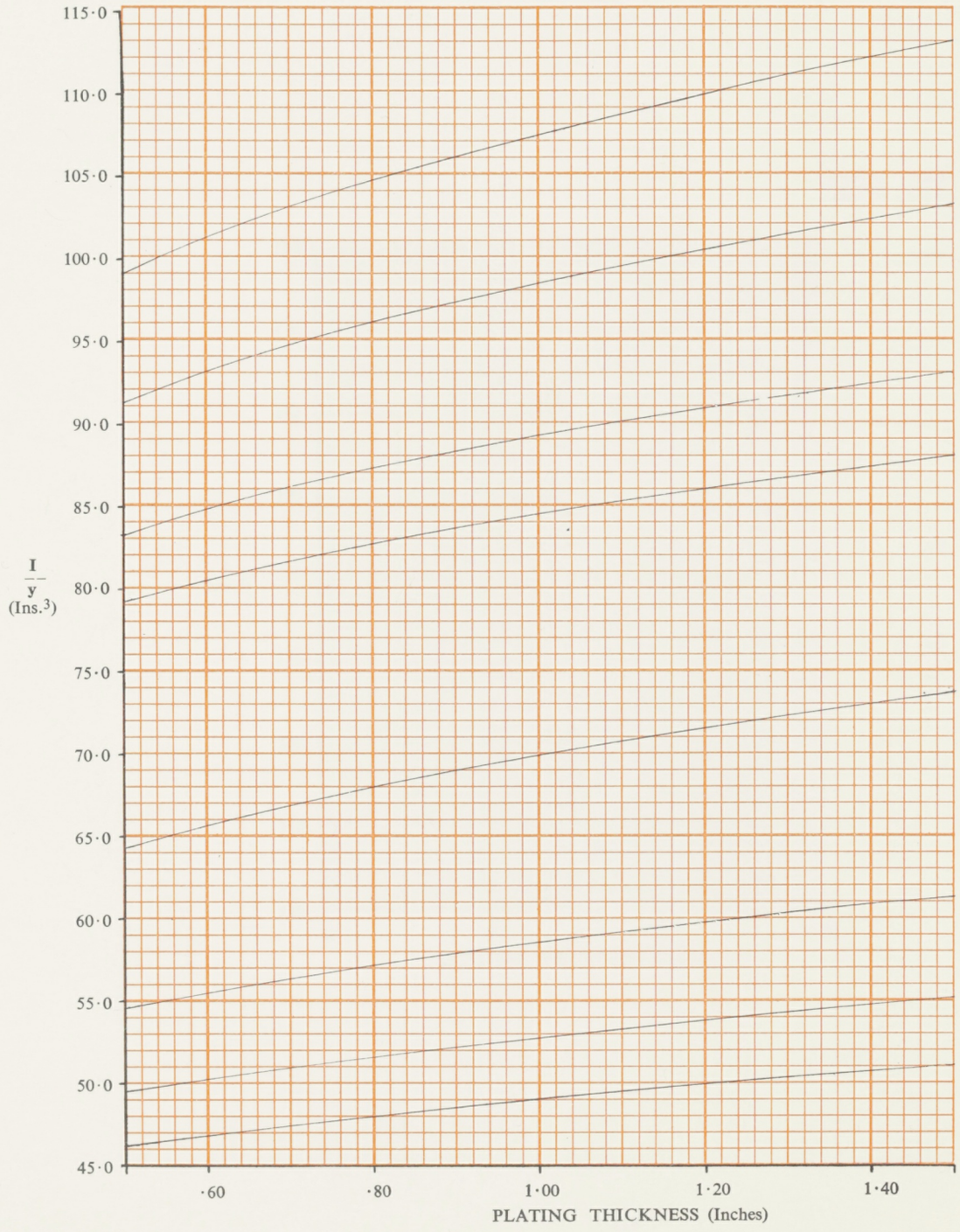
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
12	·835	·700	14·64
12	·700	·700	13·24
12	·590	·700	11·70
12	·467	·700	10·22
10	·794	·575	12·06
10	·575	·575	9·80
10	·425	·575	8·30

SECTION MODULUS AND AREA OF CHANNELS

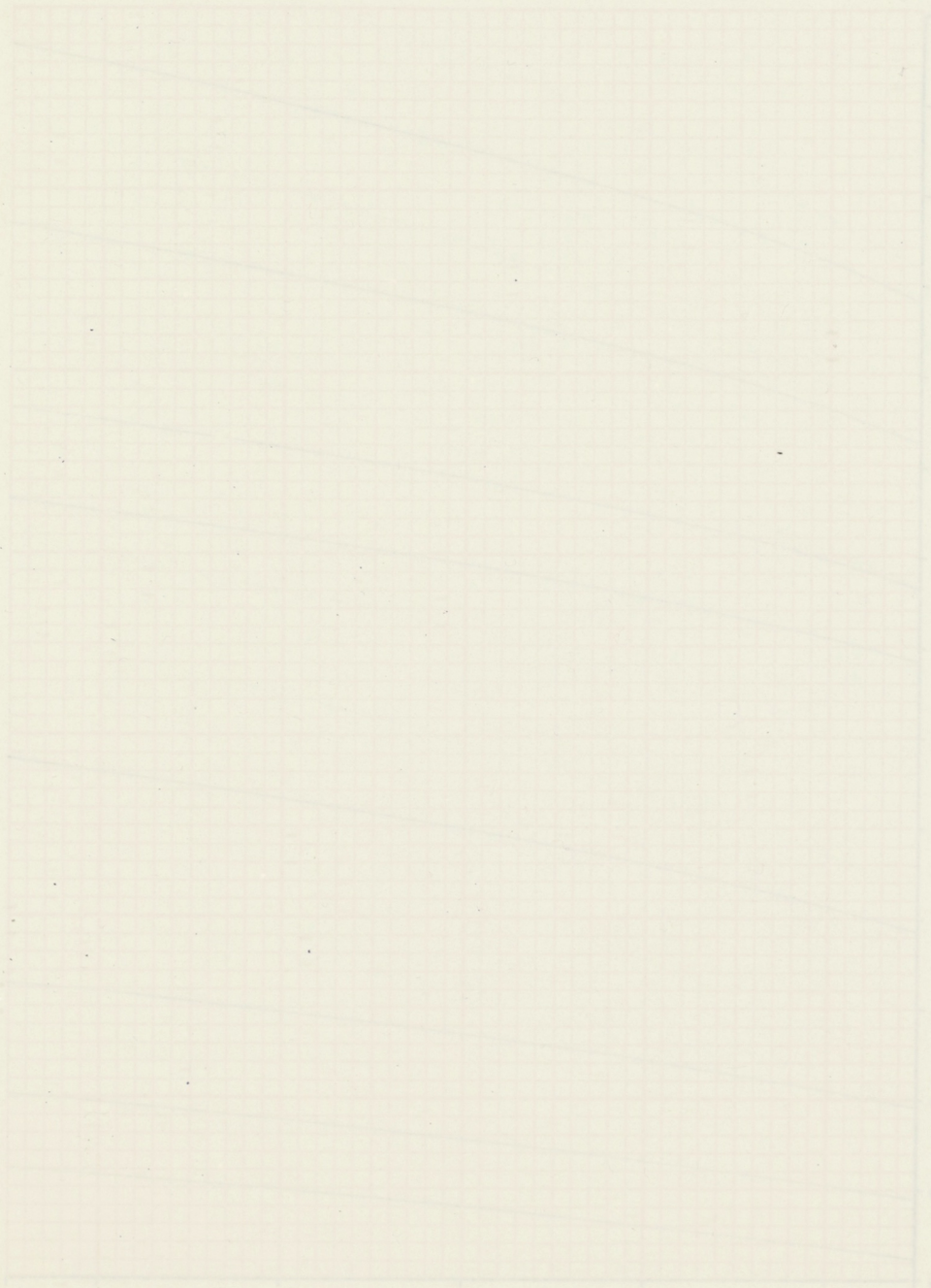
(SECTION MODULUS WITH PLATING—AREA WITHOUT PLATING)



4″ FLANGE

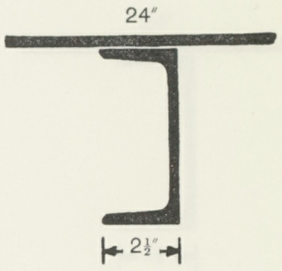


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)	AREA (Ins.2)
18	·700	·625	16·98
18	·600	·625	15·18
18	·500	·625	13·38
18	·450	·625	12·48
13	·787	·610	14·66
13	·560	·610	11·71
13	·447	·610	10·24
13	·375	·610	9·30

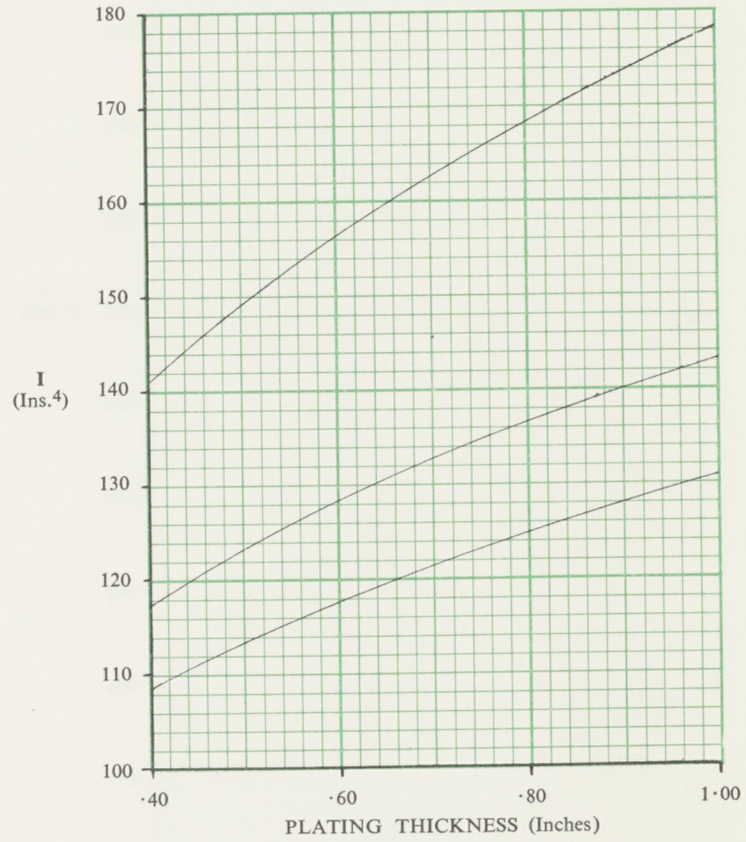


MOMENT OF INERTIA OF CHANNELS

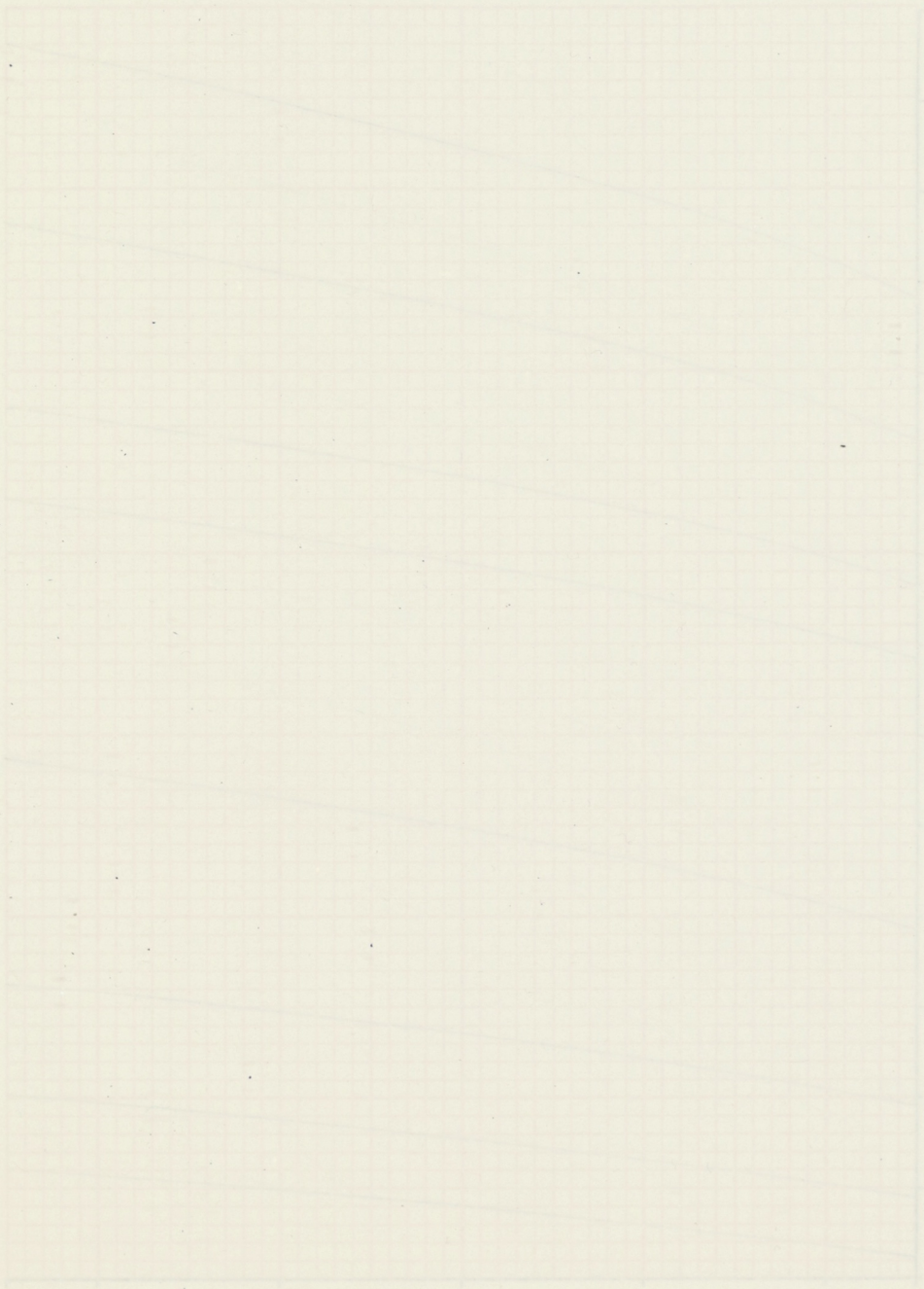
(WITH PLATING)



2½″ FLANGE

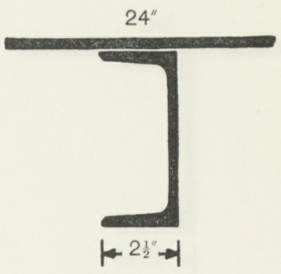


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
9	·448	·413
9	·285	·413
9	·230	·413

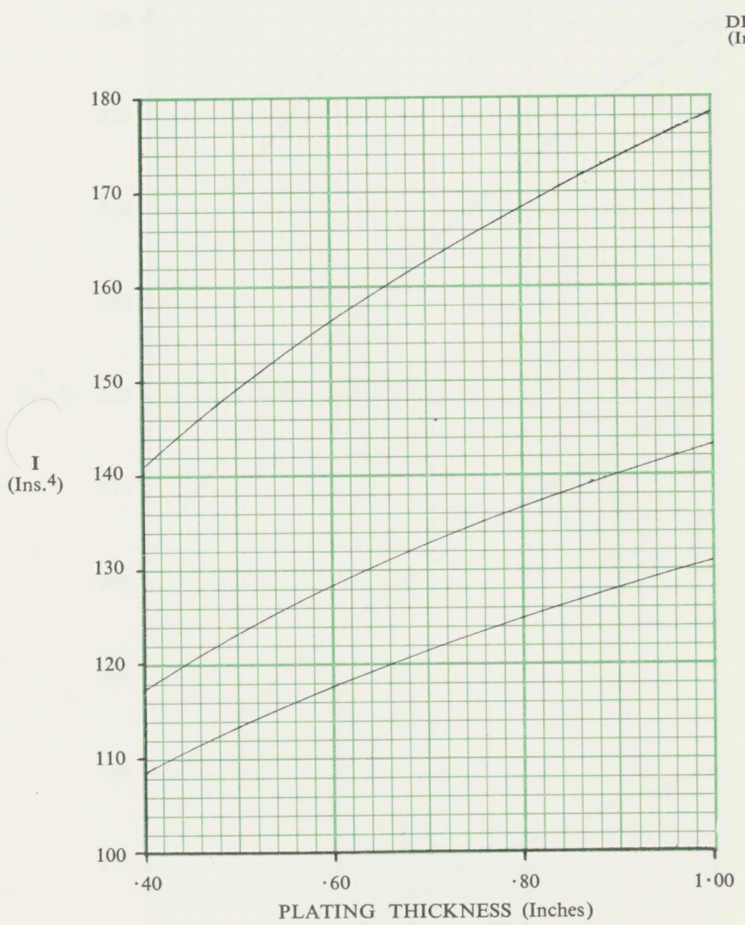


MOMENT OF INERTIA OF CHANNELS

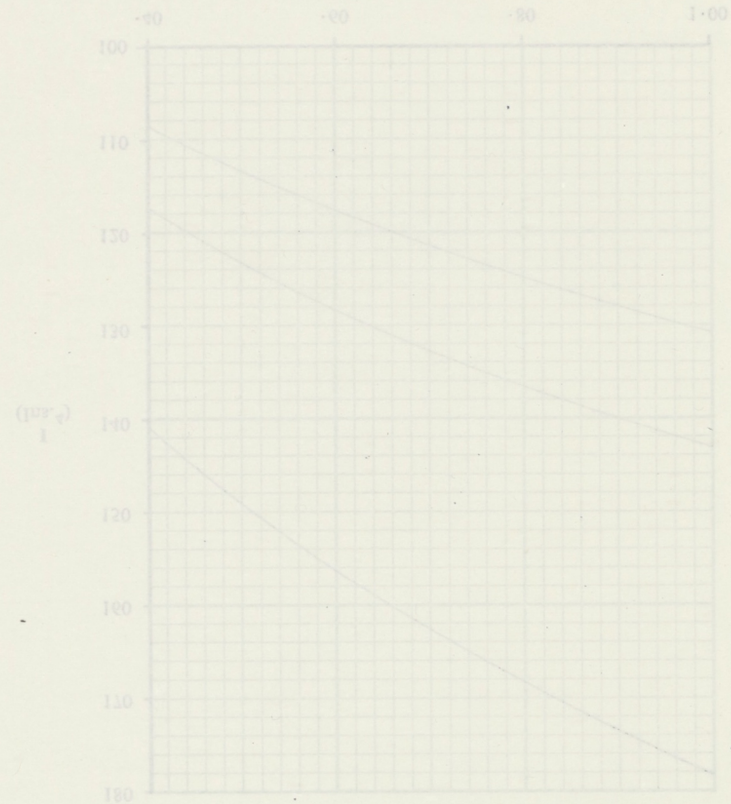
(WITH PLATING)



2½″ FLANGE



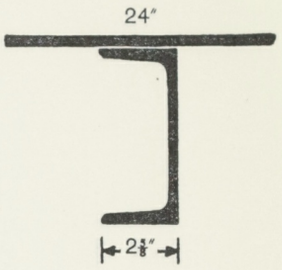
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
9	·448	·413
9	·285	·413
9	·230	·413

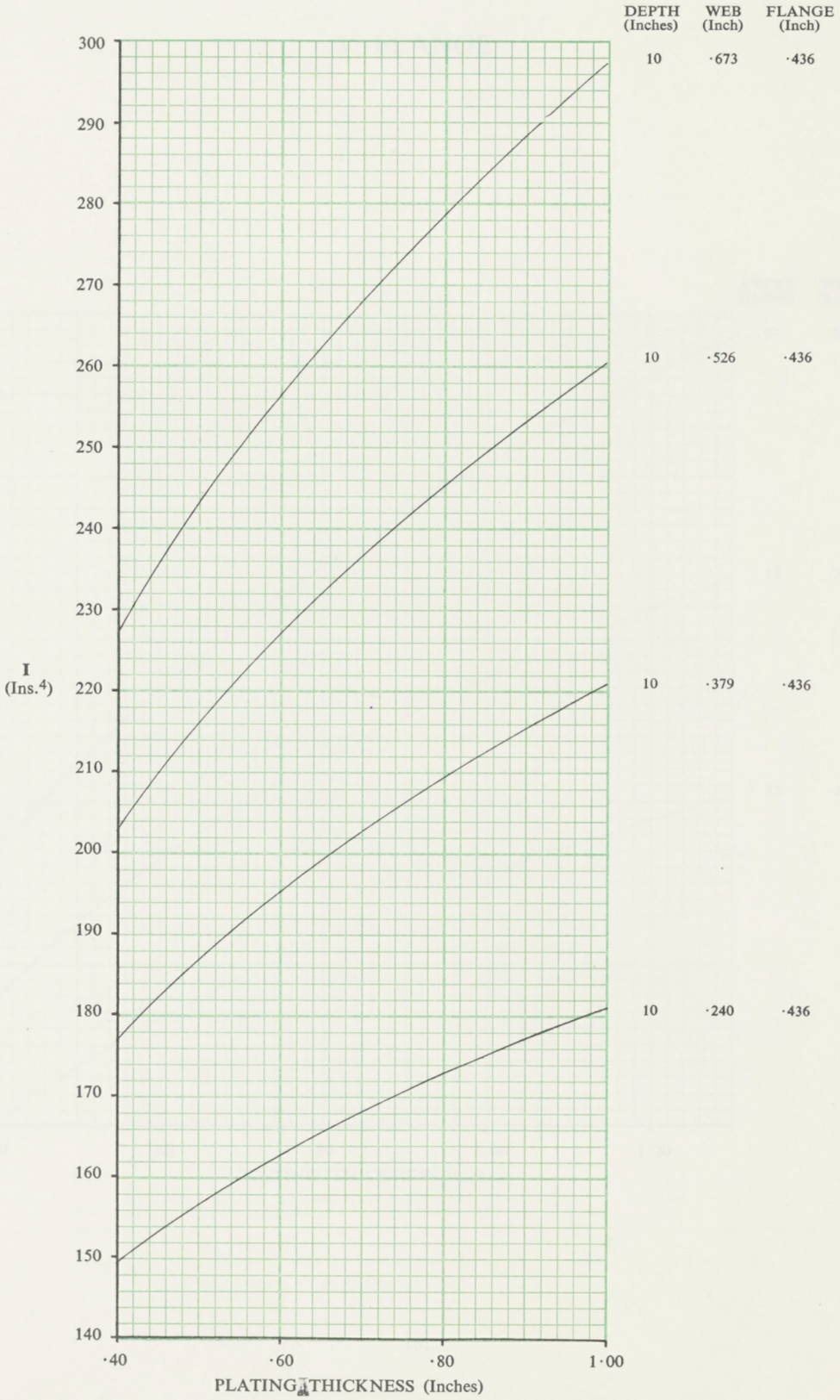


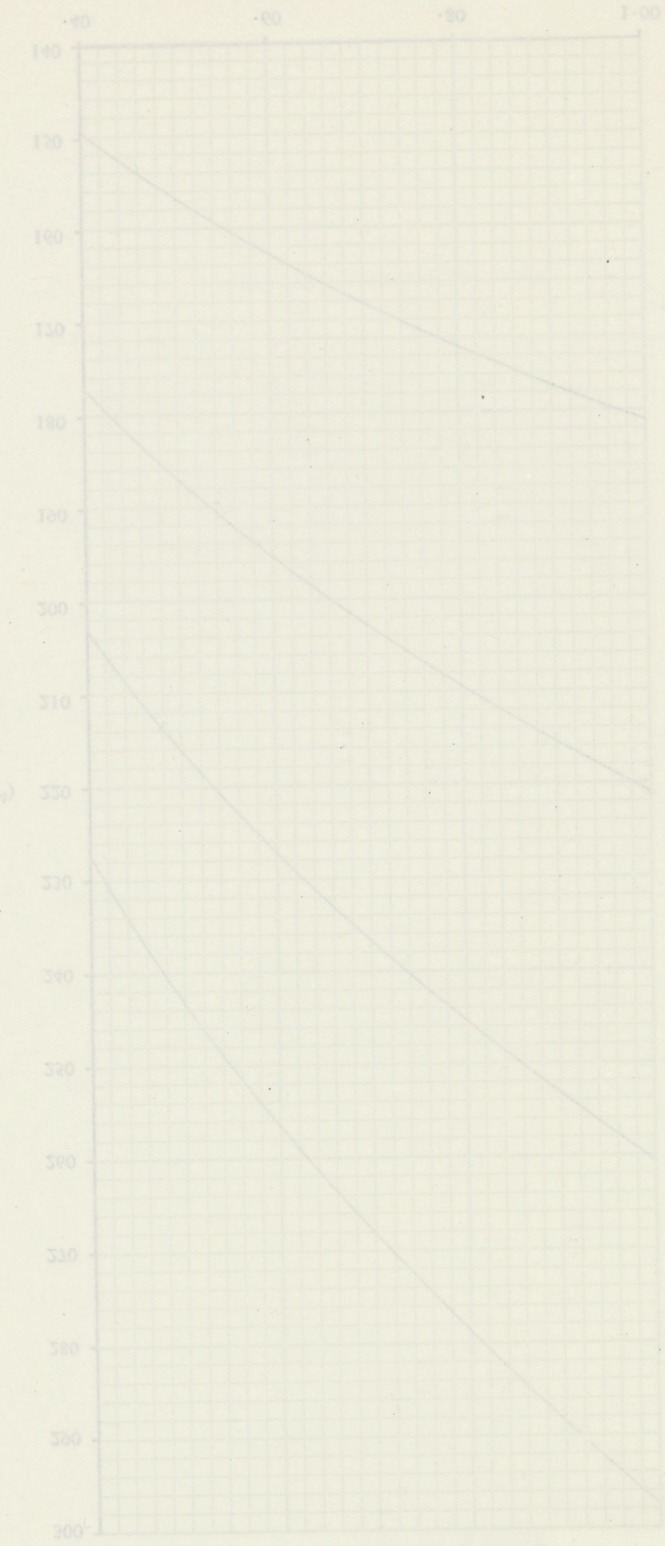
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

$2\frac{5}{8}$″ FLANGE

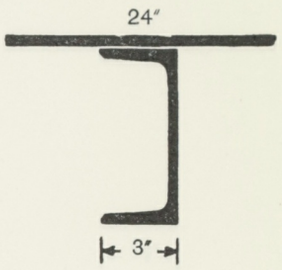




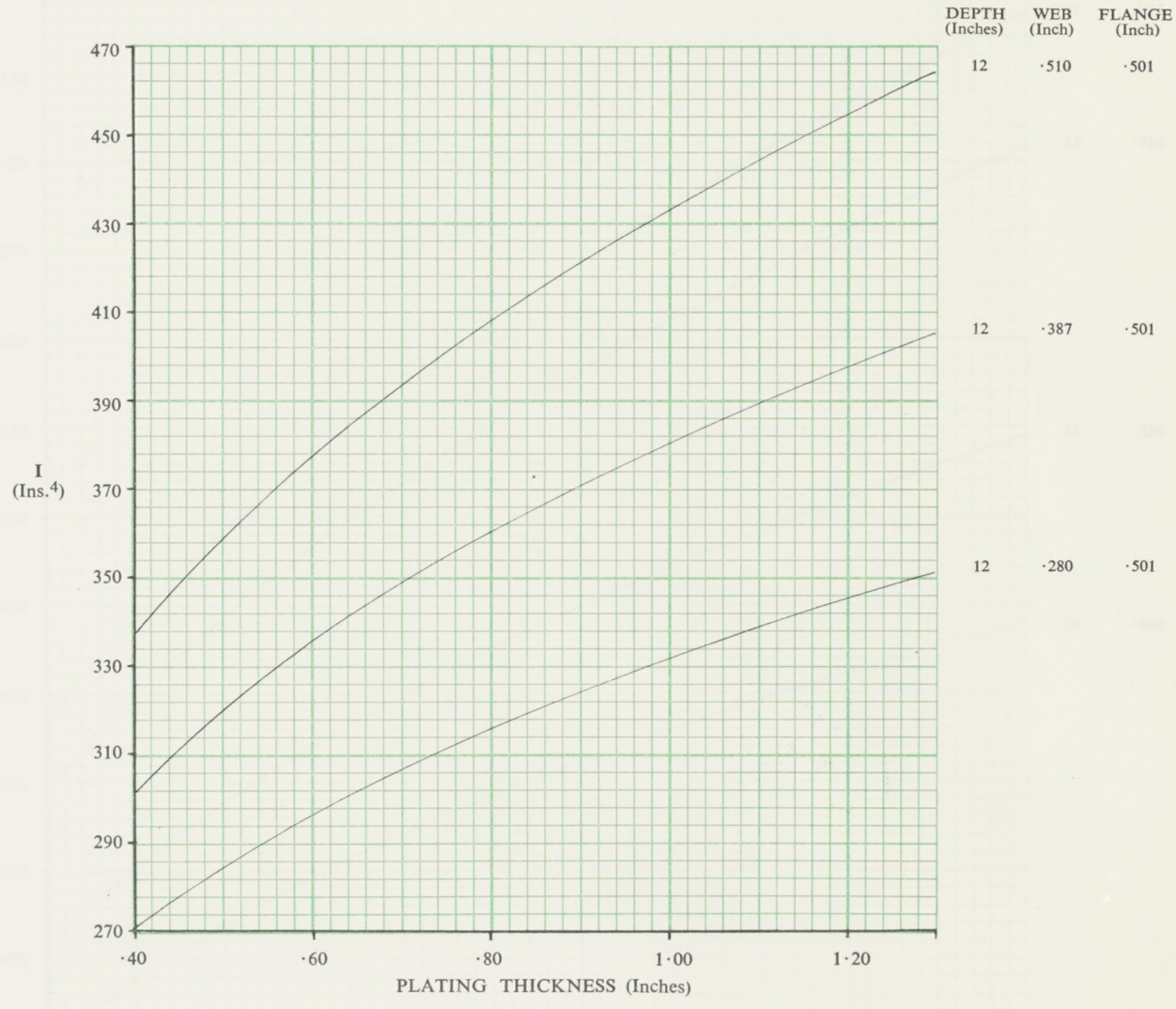


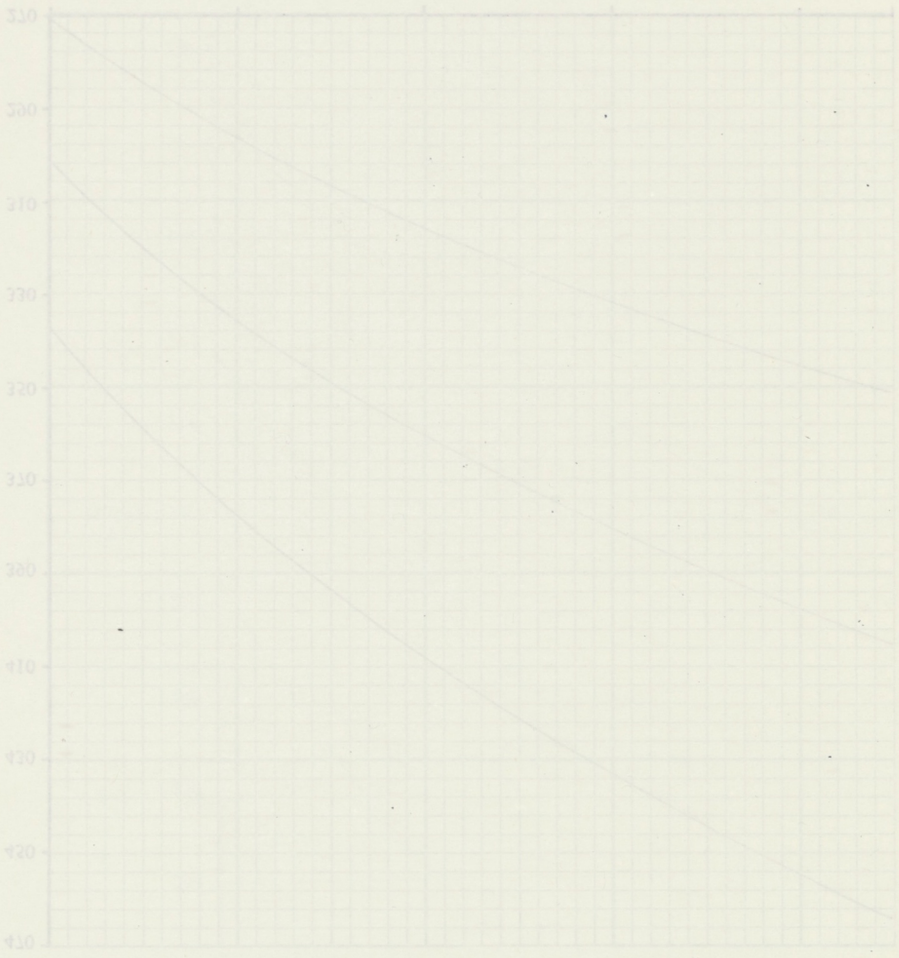
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



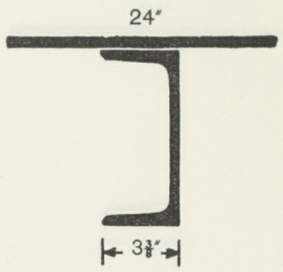
3″ FLANGE



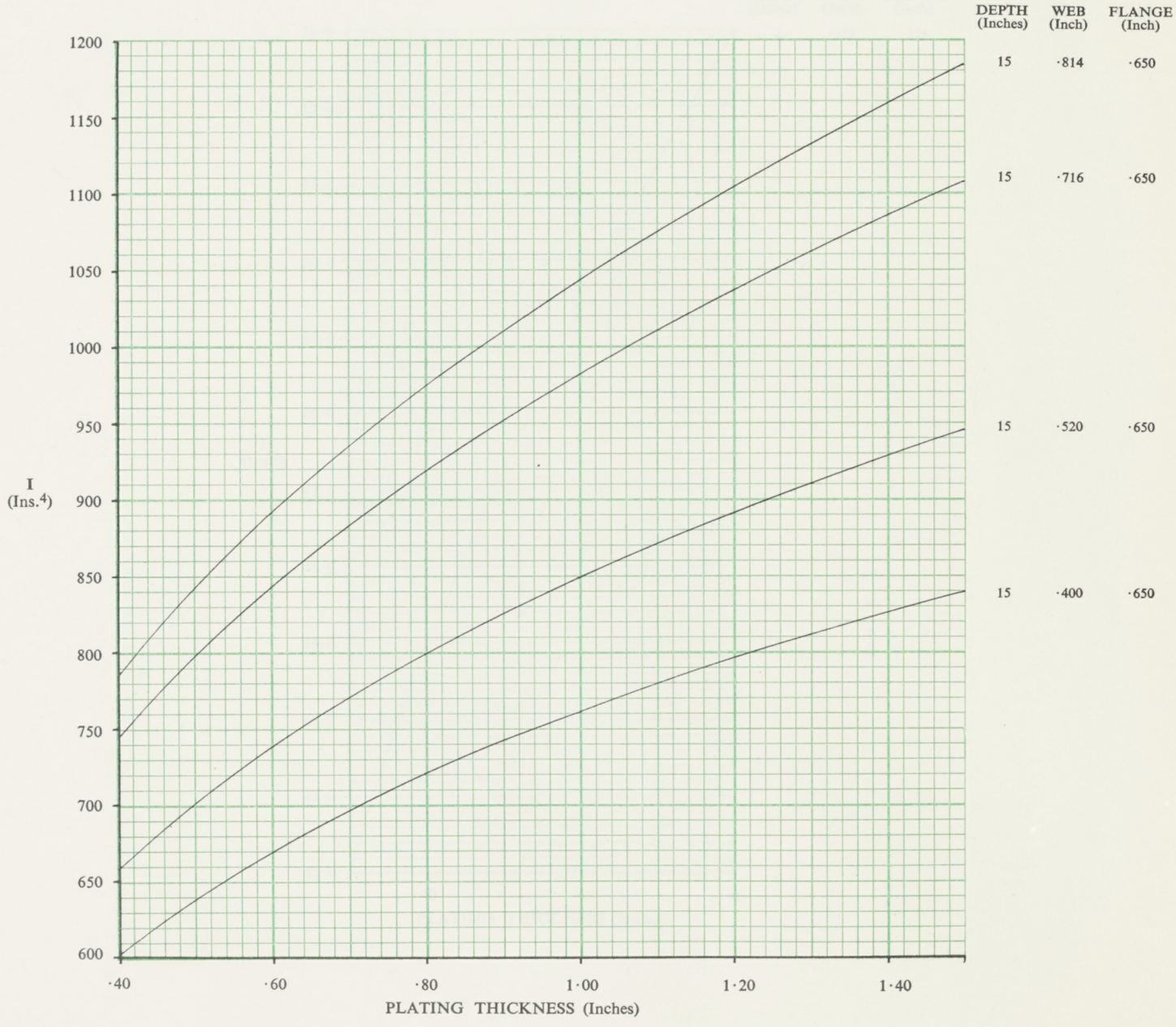


MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



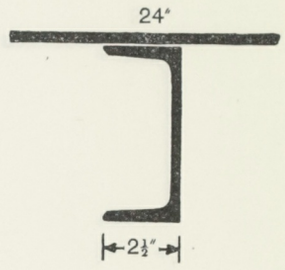
3⅜″ FLANGE



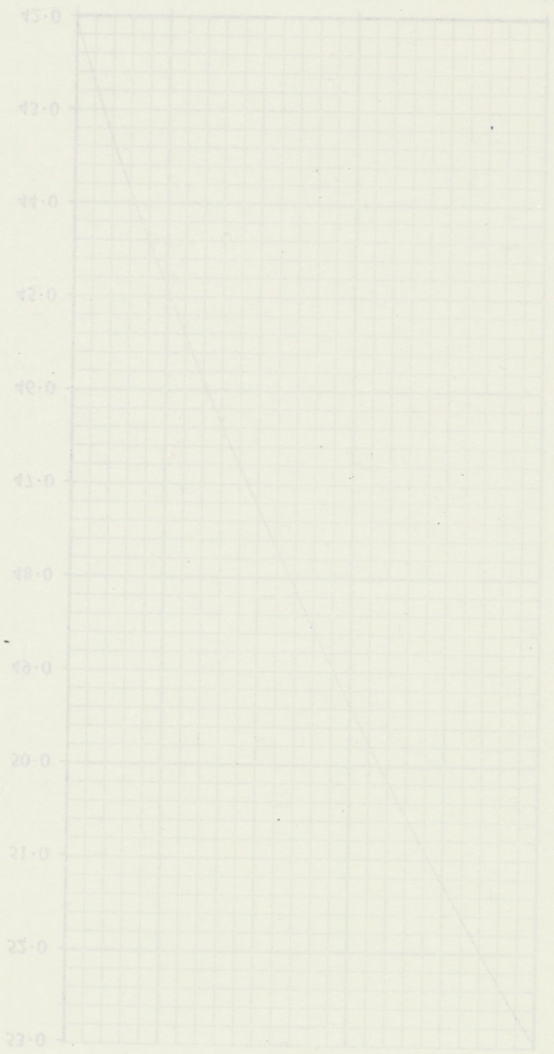
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
15	·814	·650
15	·716	·650
15	·520	·650
15	·400	·650

MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

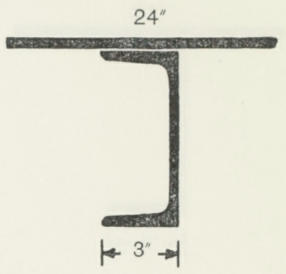


2½" FLANGE

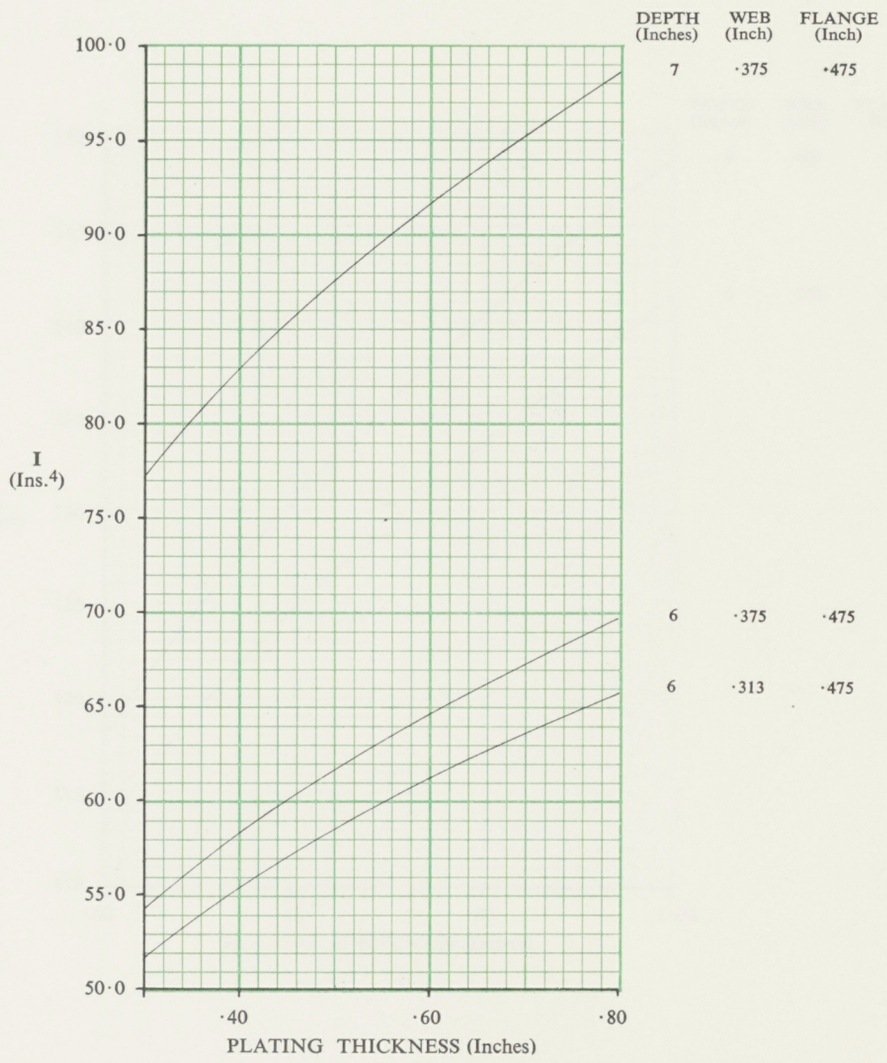


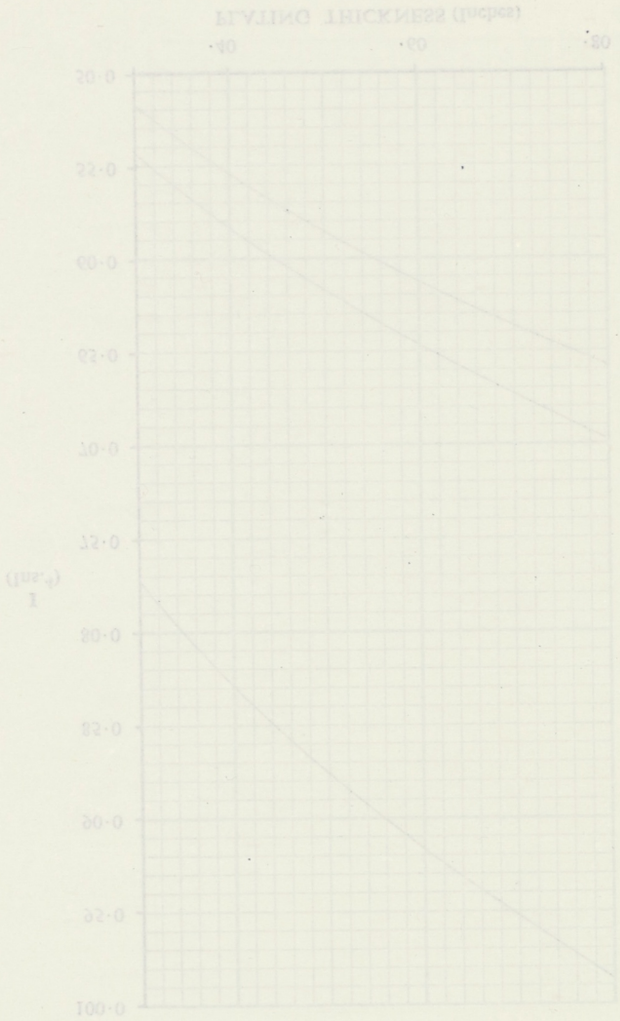
MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

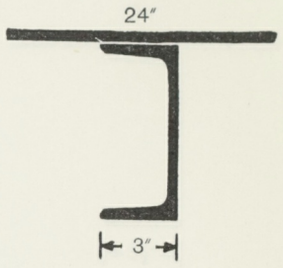


3″ FLANGE

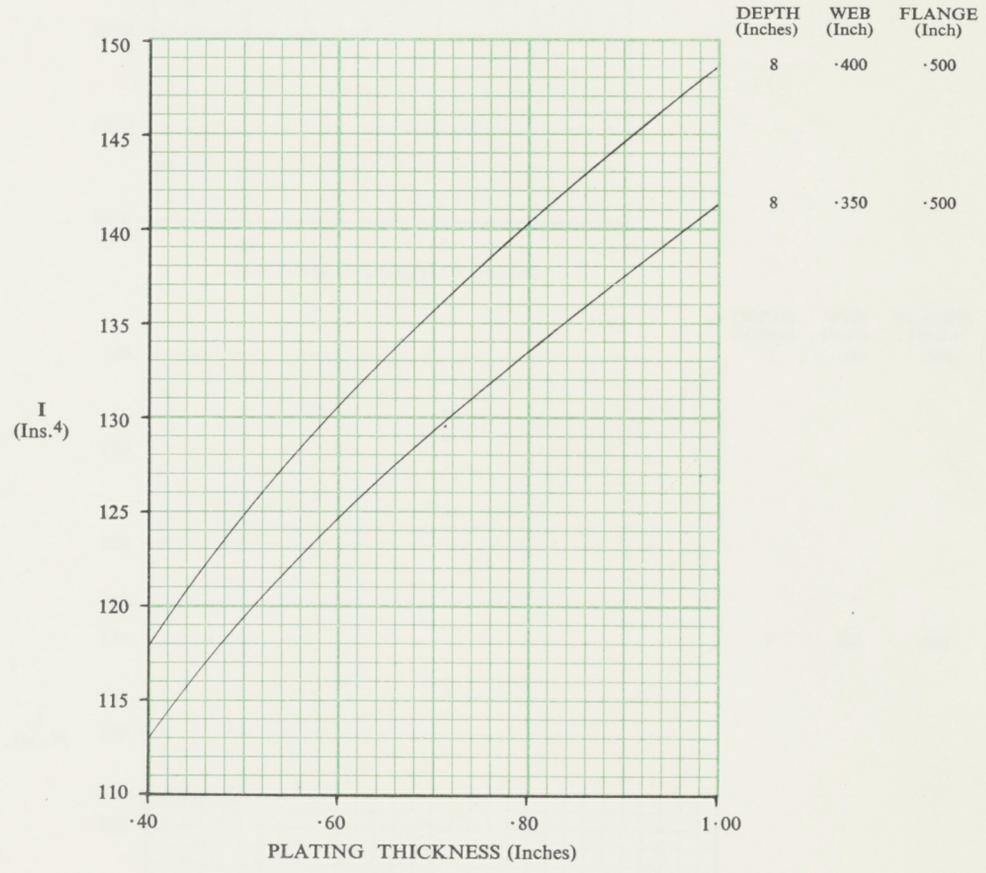




MOMENT OF INERTIA OF CHANNELS
(WITH PLATING)



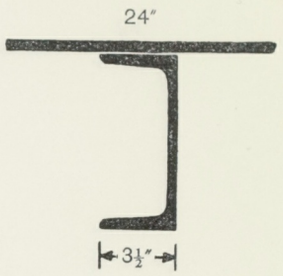
3″ FLANGE

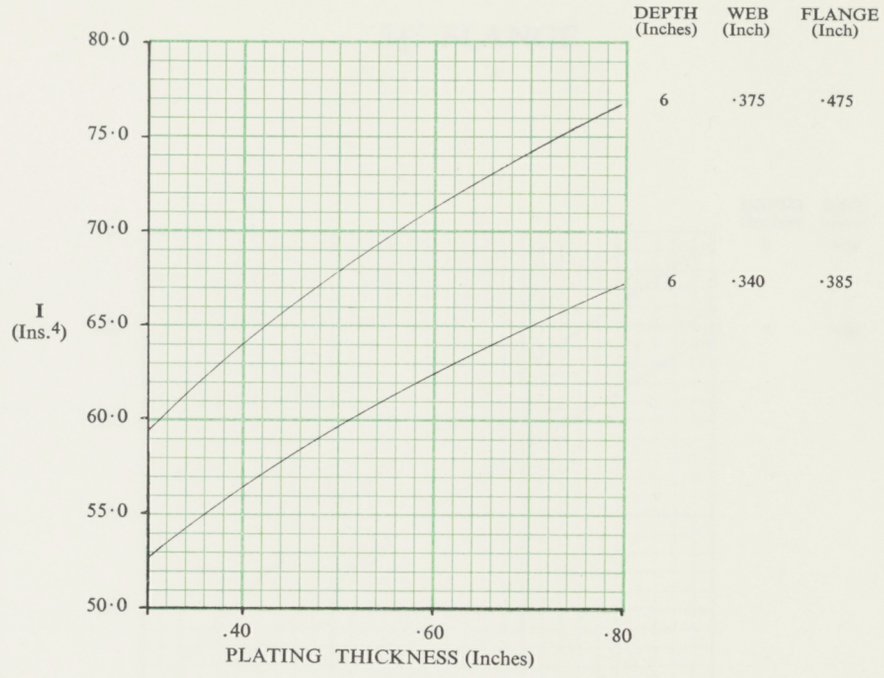


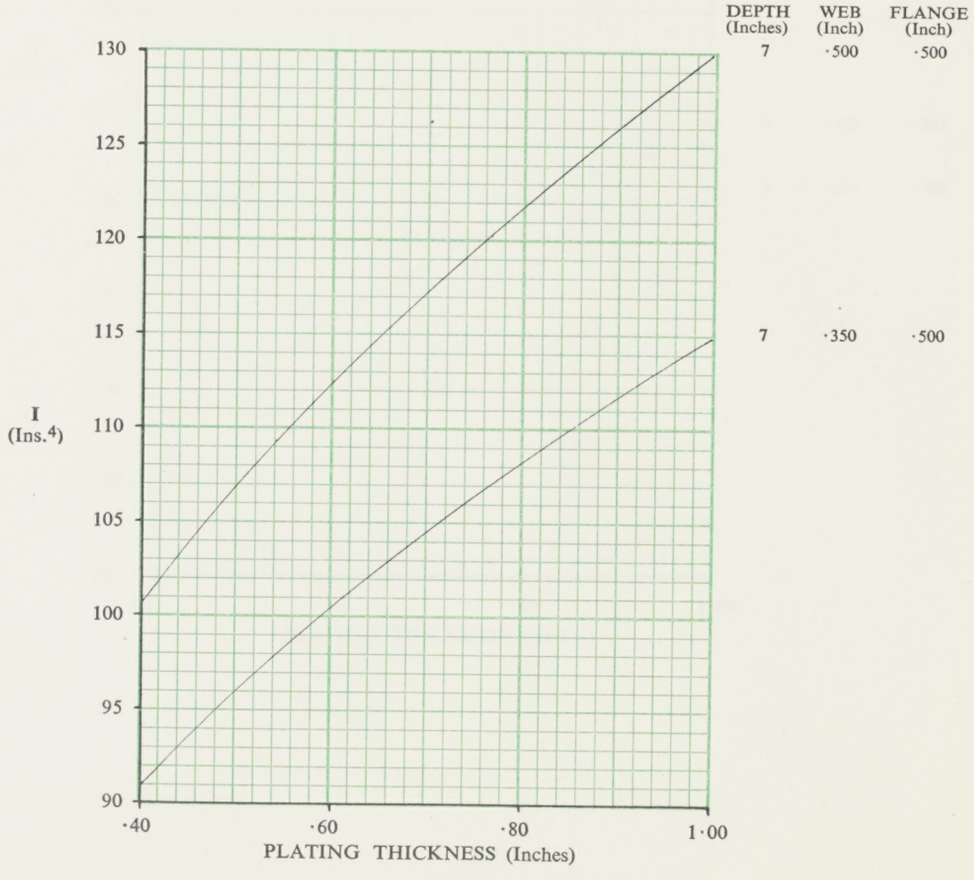
MOMENT OF INERTIA OF CHANNELS

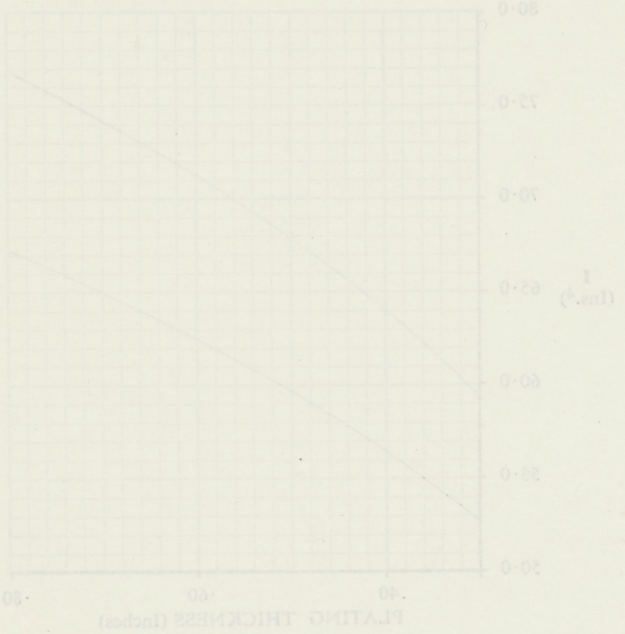
(WITH PLATING)

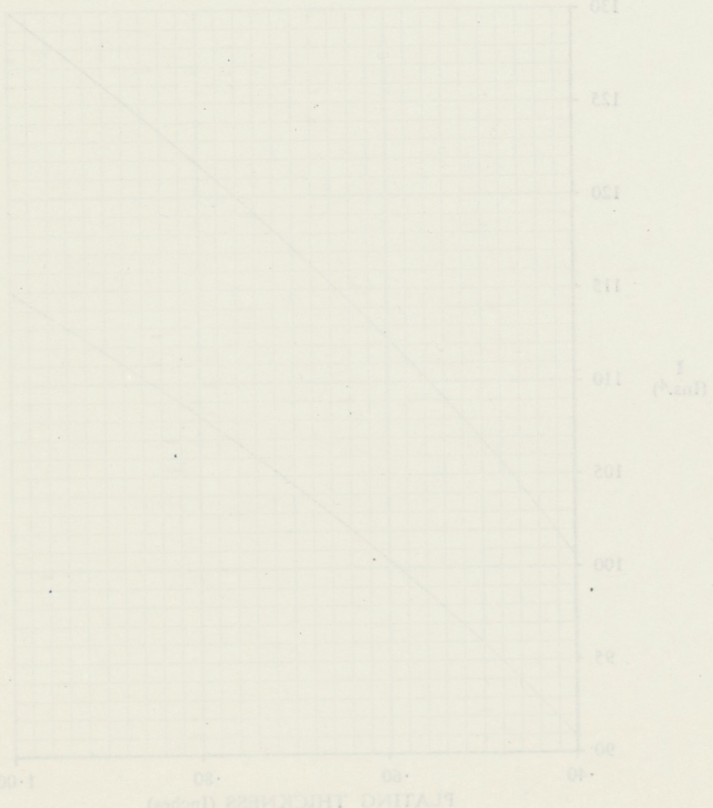
$3\frac{1}{2}''$ FLANGE





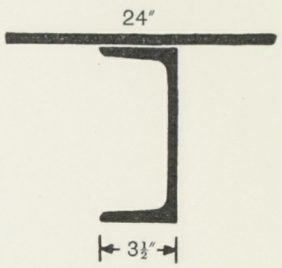




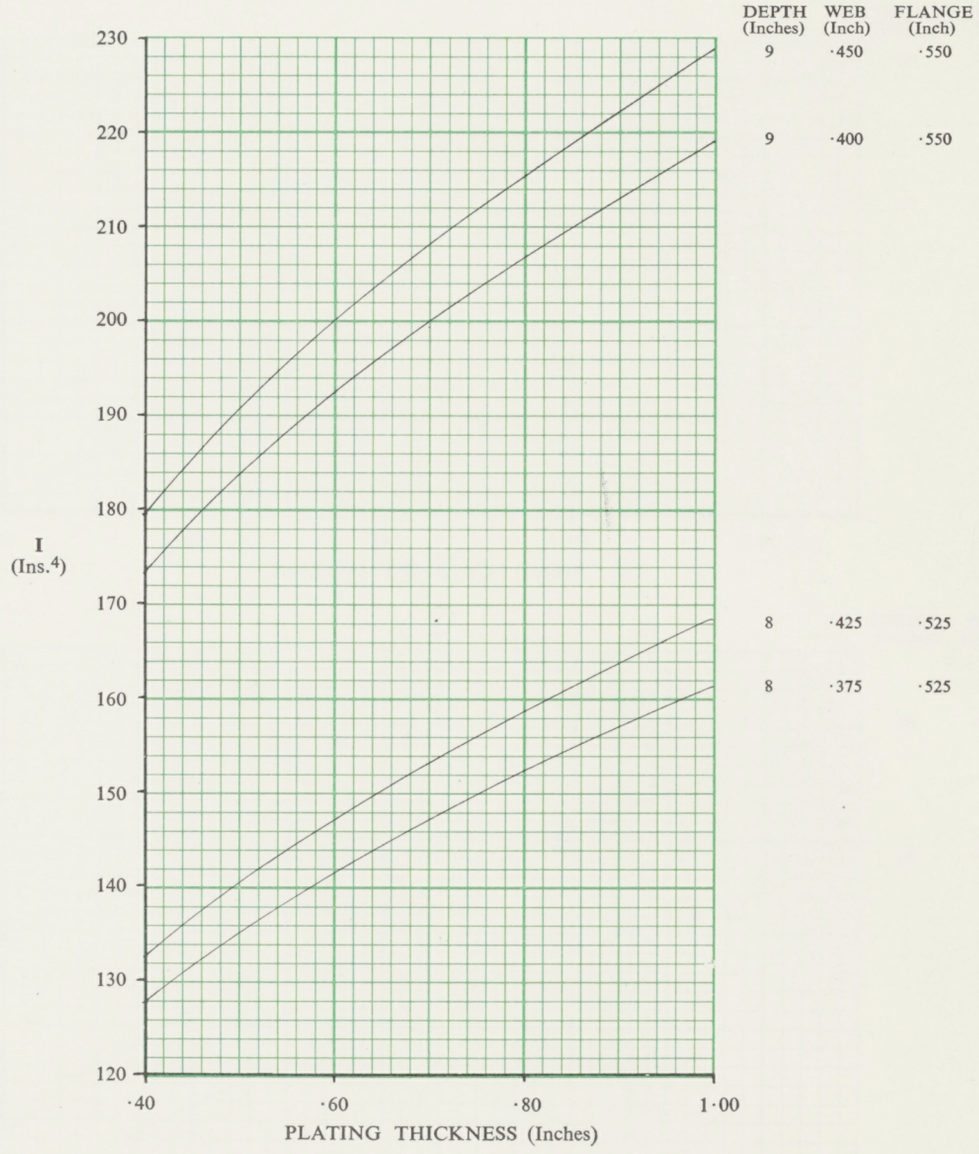


MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)

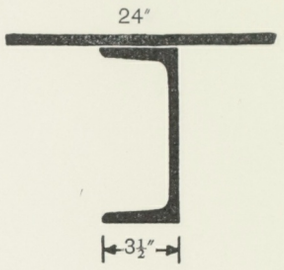


3½″ FLANGE

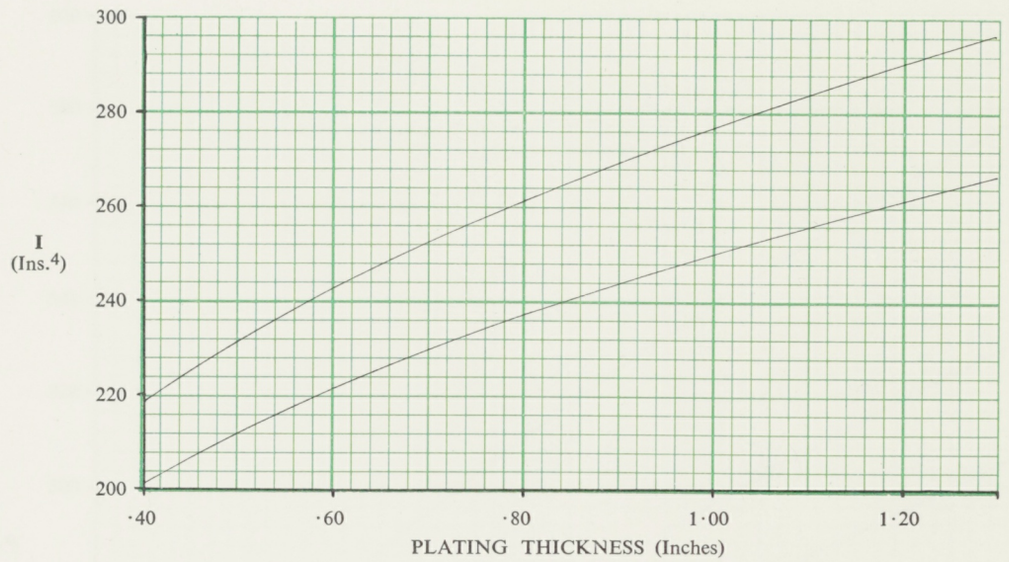


MOMENT OF INERTIA OF CHANNELS

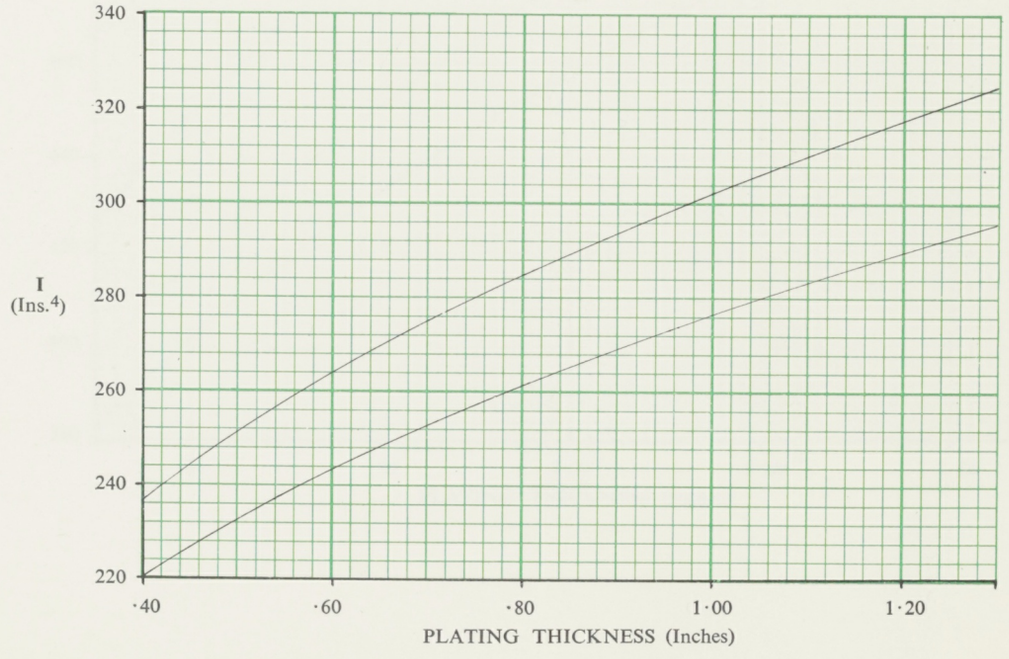
(WITH PLATING)



3½″ FLANGE



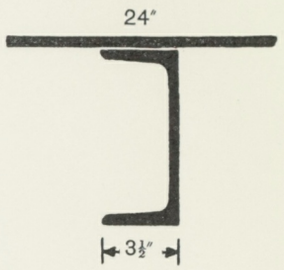
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
10	·425	·500
10	·325	·500



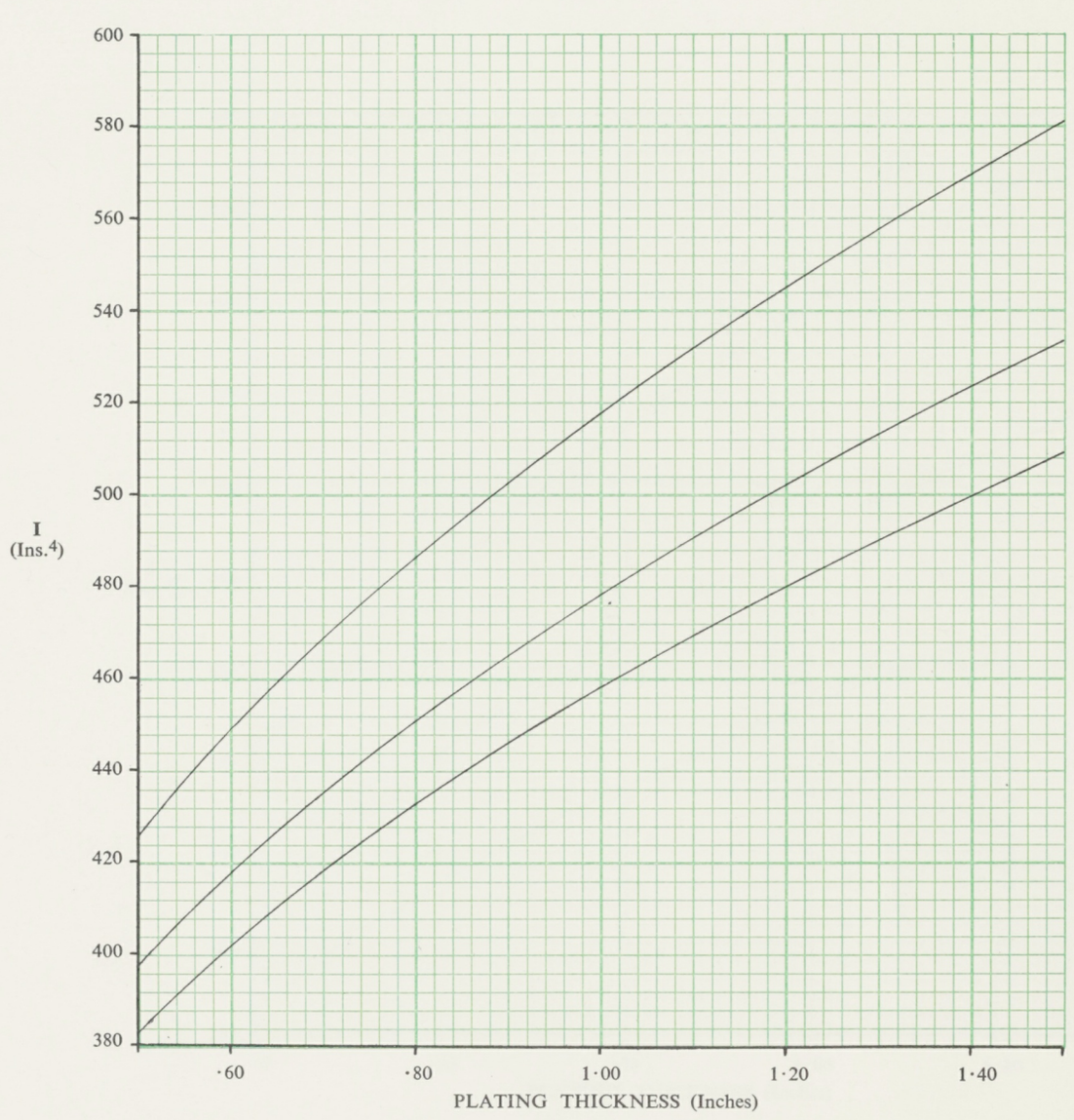
DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
10	·475	·575
10	·375	·575

MOMENT OF INERTIA OF CHANNELS

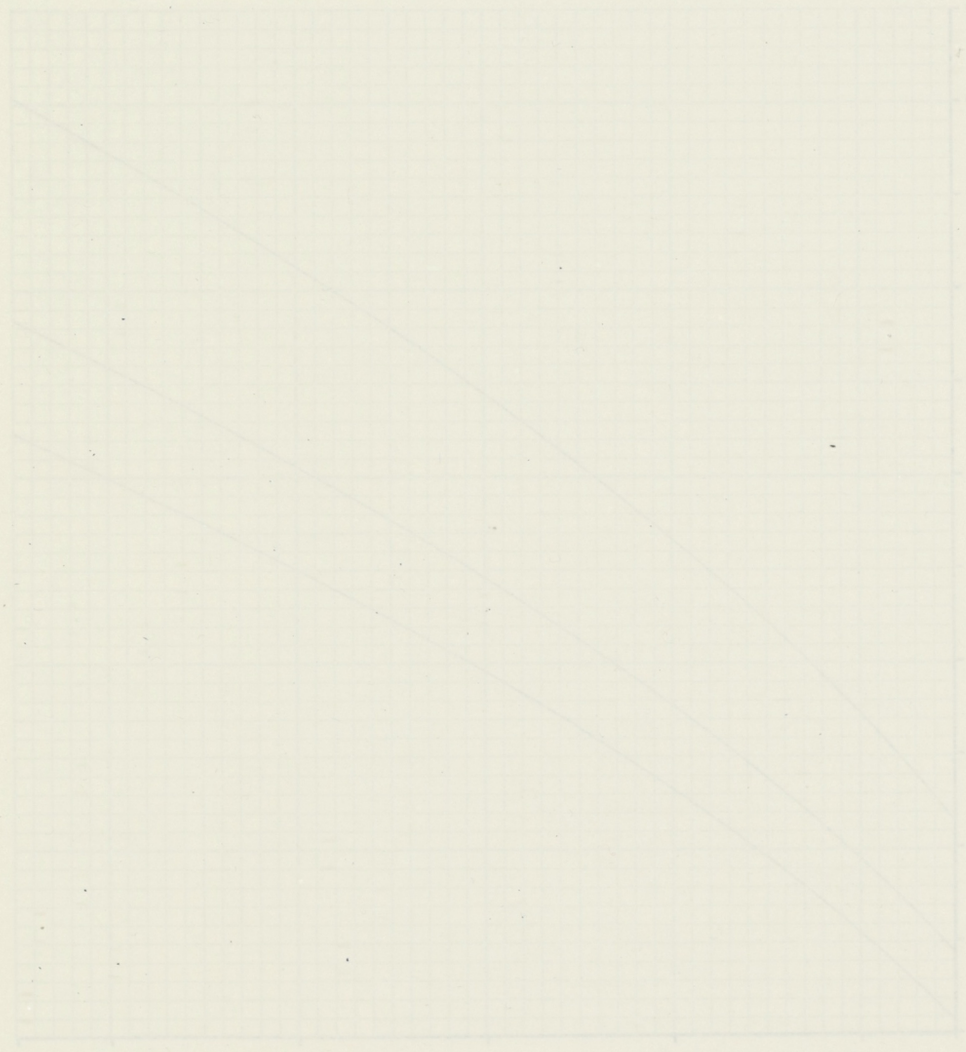
(WITH PLATING)



3½″ FLANGE

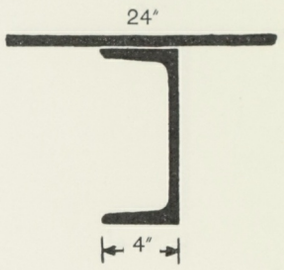


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
12	·600	·600
12	·500	·600
12	·450	·600

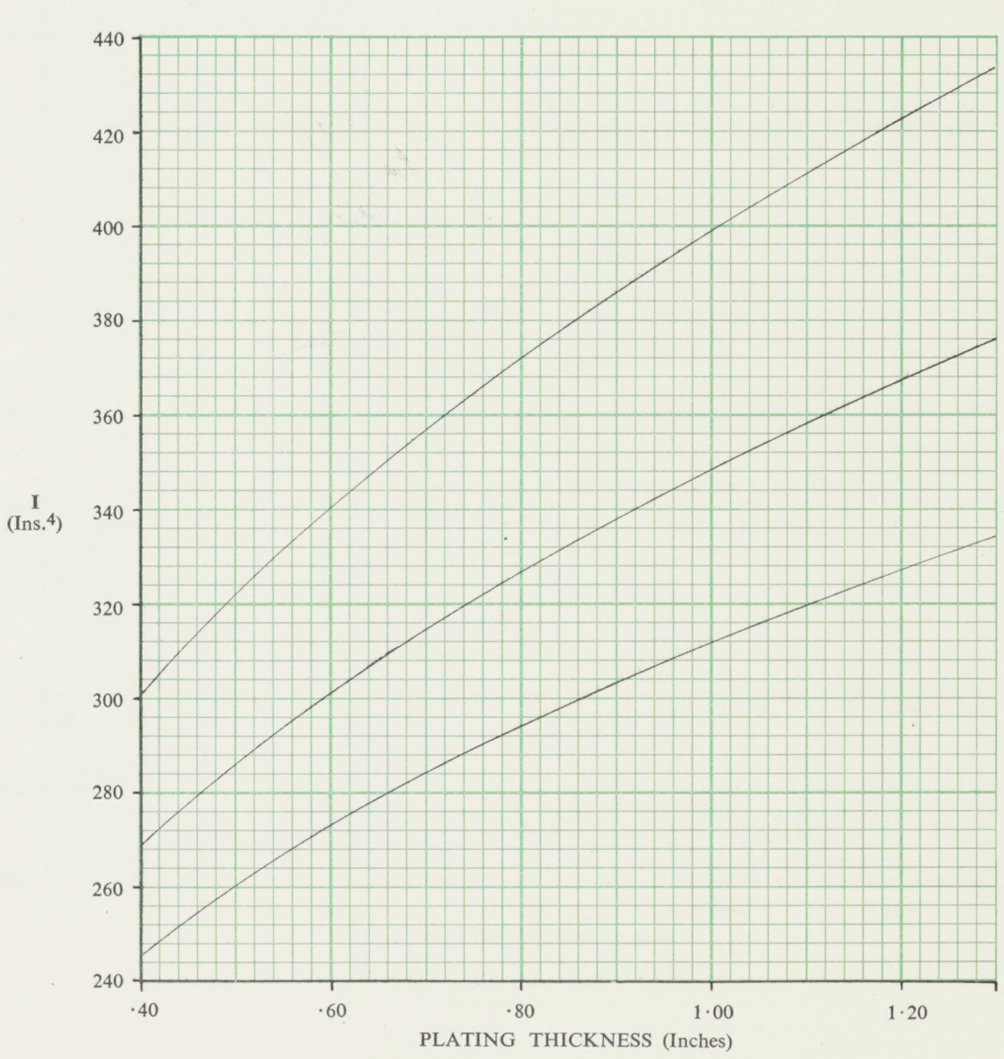


MOMENT OF INERTIA OF CHANNELS

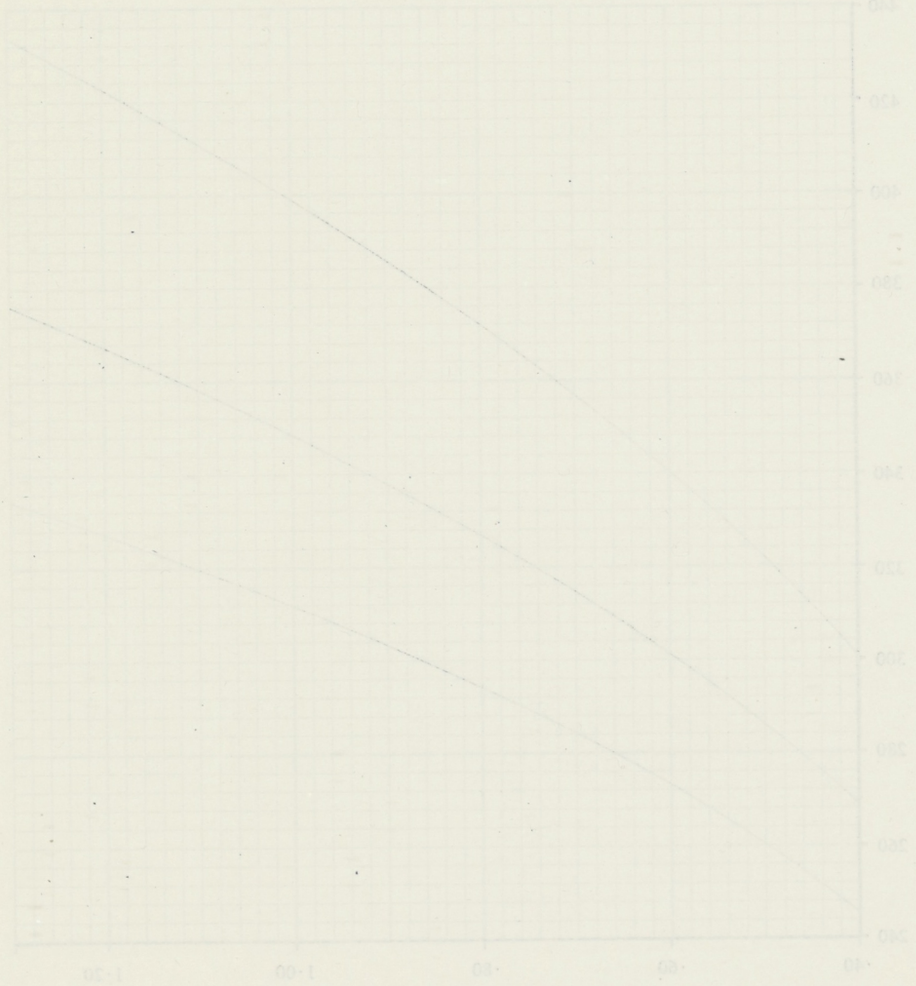
(WITH PLATING)



4″ FLANGE

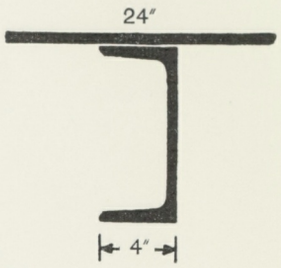


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
10	·794	·575
10	·575	·575
10	·425	·575

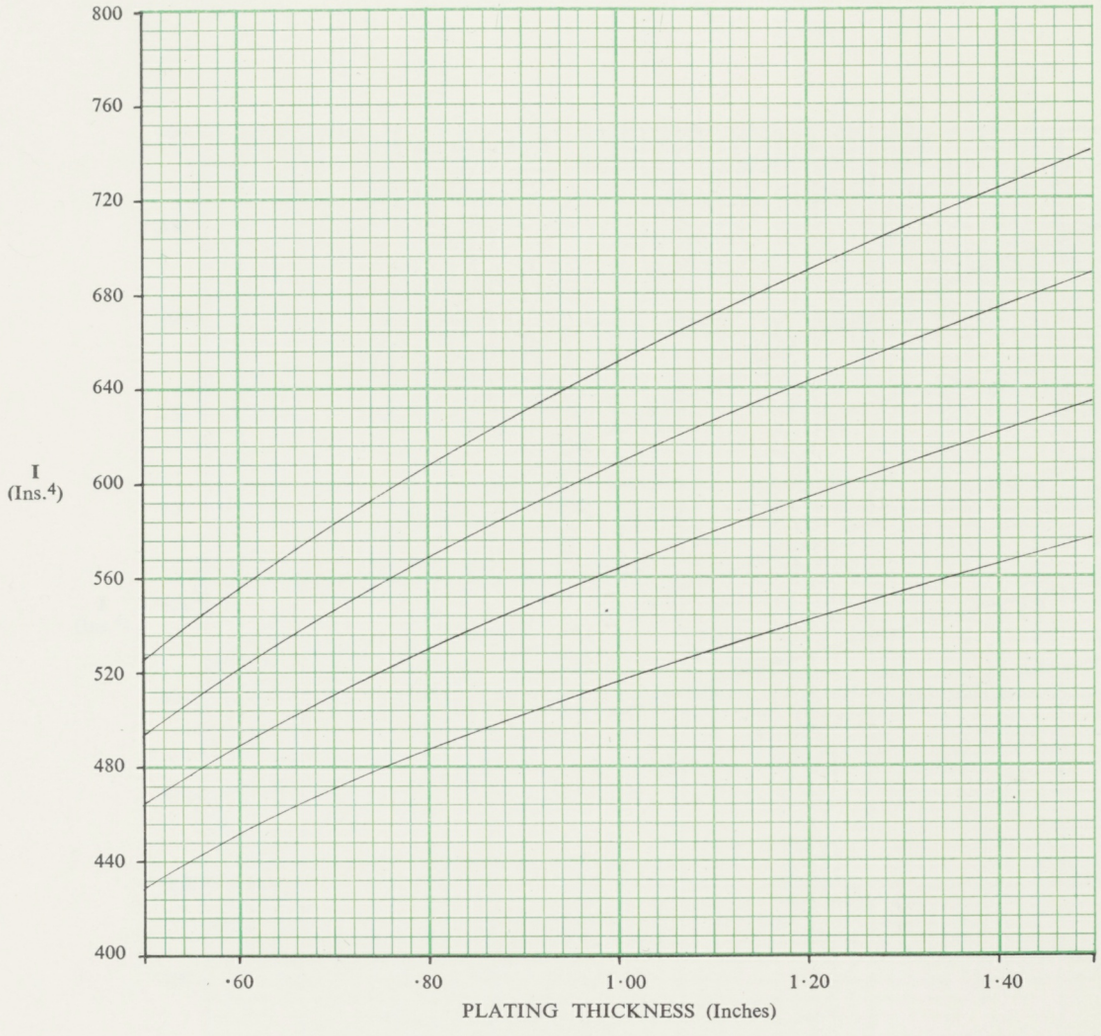


MOMENT OF INERTIA OF CHANNELS

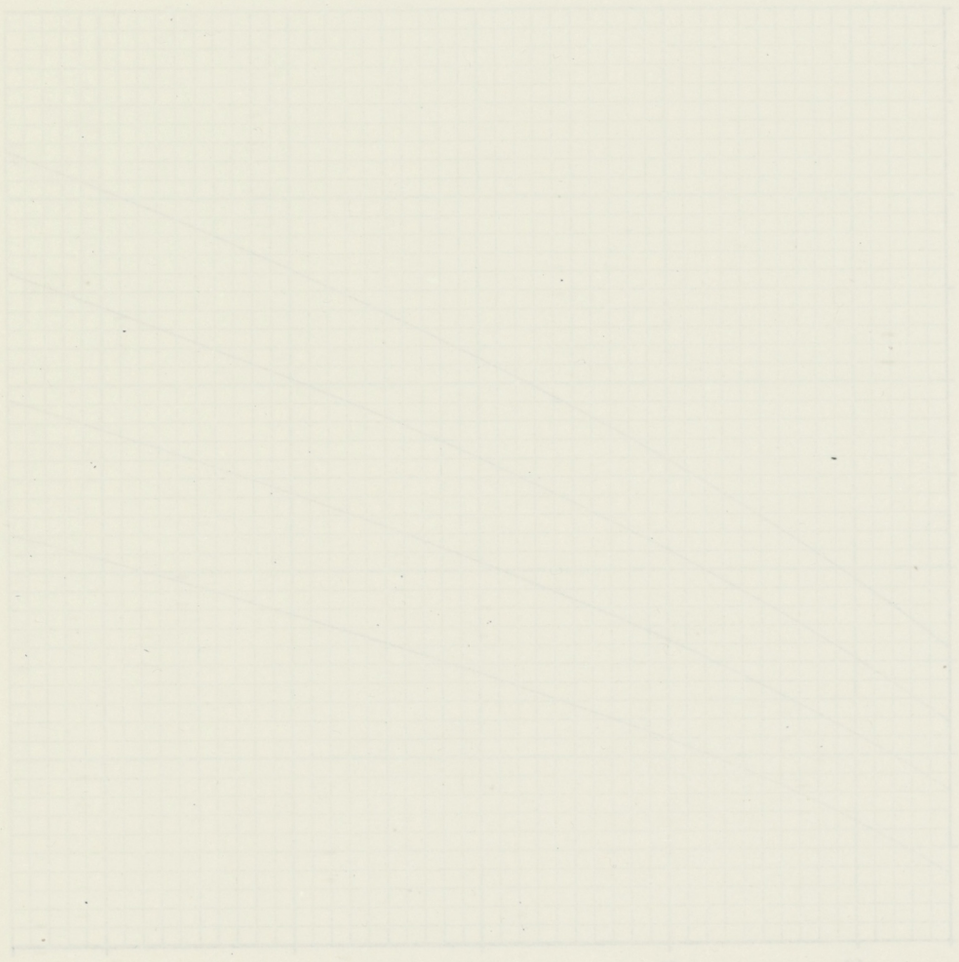
(WITH PLATING)



4″ FLANGE

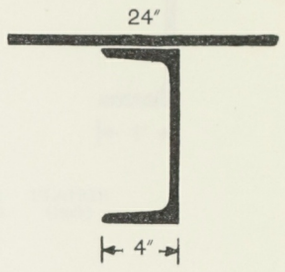


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
12	·835	·700
12	·700	·700
12	·590	·700
12	·467	·700

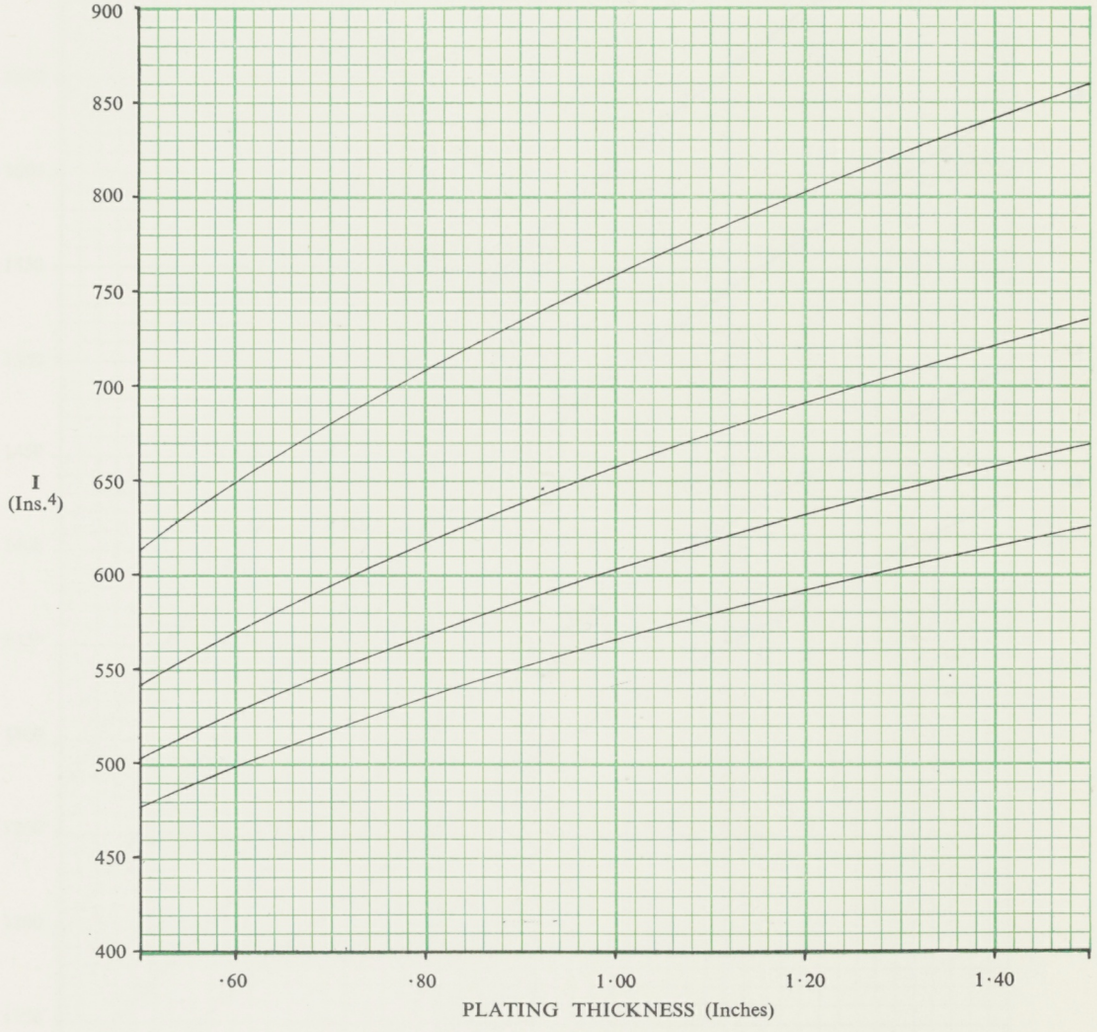


MOMENT OF INERTIA OF CHANNELS

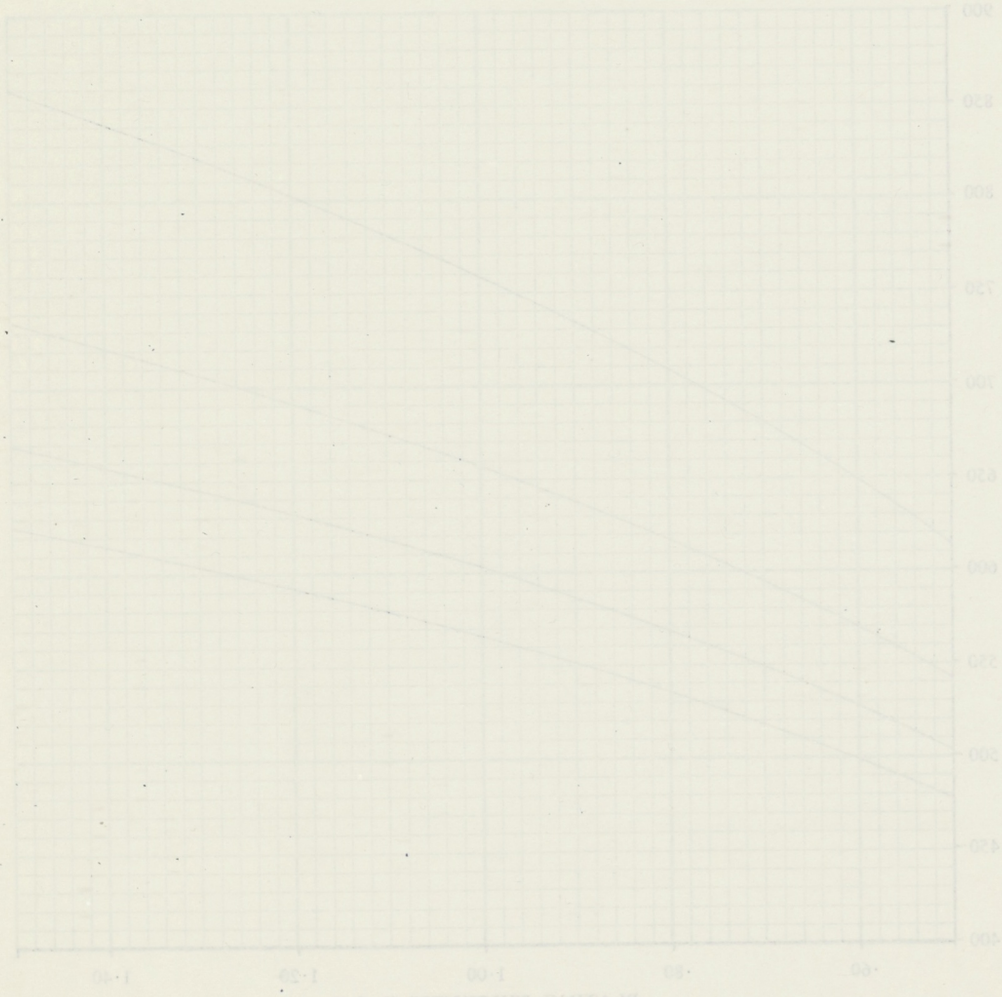
(WITH PLATING)



4″ FLANGE

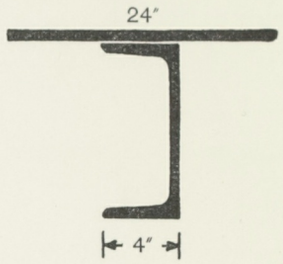


DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
13	·787	·610
13	·560	·610
13	·447	·610
13	·375	·610



MOMENT OF INERTIA OF CHANNELS

(WITH PLATING)



4″ FLANGE

DEPTH (Inches)	WEB (Inch)	FLANGE (Inch)
18	·700	·625
18	·600	·625
18	·500	·625
18	·450	·625